HURON COUNTY ENERGY CONSERVATION STUDY

EXECUTIVE SUMMARY

This Planning Study, entitled Energy Conservation, By Choice, examines how Planning in Huron County will achieve energy conservation in all sectors. In addition to Planning, the Study concludes that many gains can be achieved in the County through voluntary conservation.

The underlying theme in the Study is that energy conservation should not be made mandatory in the County. This is a decision that is left to individuals and groups who choose to wisely use energy resources.

The Study concludes that during the next decade in Huron County, there will be improved energy efficiencies on the farm resulting in greater productivity; thermal efficiencies will be improved in existing housing in the County; commerce and industry will continue to reduce the energy cost component of their products; and conversions from oil to natural gas, electricity and wood will continue to be acceptable in the residential sector.

These shorter term expectations arise from the realization that population growth will continue to be relatively slow; the County will continue to be a strong rural agricultural community with significant settlements; and that up to 90% of to-day's housing units will exist in 10 years.

Oil will be the major fuel for space heating in the residential sector and on the farm in spite of conversions to natural gas and wood. Electricity will maintain its share of overall consumption although its pricing structure needs to be carefully assessed.

It is evident that Planning in Huron County is an effective support system for energy conservation. The Study recommends energy conservation objectives for official plans which support the Provincial Government's targets and identifies specific policies which will provide a comprehensive approach to County and local planning. The Food Land Guidelines strongly support energy conservation in Huron County.

The Study strongly recommends that the County extend its support system through an outreach programme which provides energy conservation information to the community; regularly advises the County of its energy conservation achievements; and continuously monitors the progress of its Planning programme.

Energy Conservation, By Choice was undertaken by Mark L. Dorfman, Planner Inc., Ecological Services for Planning Ltd. and R. J. Long Consulting Limited under the direction of Dr. Gary Davidson, Director of Planning for Huron County. The Study was prepared within the "Energy Conservation Through Official Plans" guidelines of the Ontario Ministry of Municipal Affairs and Housing.

ENERGY CONSERVATION, BY CHOICE

An energy conservation approach in Huron County

VOLUME 1

THE APPROACH TO ENERGY CONSERVATION IN HURON COUNTY

MAY, 1984

Submitted to County of Huron
by
MARK L. DORFMAN, PLANNER INC.
in Association with

ECOLOGICAL SERVICES FOR PLANNING LTD.
R. J. LONG CONSULTING LIMITED

VOLUME 1

TABLE OF CONTENTS

SECTION		PAGE
1.0	THE PREFACE	1
1.1	Study Origin	1
1.2	Technical Advisory Committee	2
1.3	Study Team	2
1.4	Approach to Study	3
2.0	DIRECTION OF THE REPORT	7
2.1	Format	7
2.2	The Principal Conclusions	7
2.3	The Focus of the Recommended Approach	11
3.0	RECOMMENDED APPROACH TO ENERGY CONSERVATION IN HURON COUNTY	14
3.1	The Official Plans	14
3.2	The Zoning By-law	27
3.3	Site Plan Control	28
3.4	Food Land Guidelines	29
3.5	Outreach	30
3.6	Continuous Monitoring of Official Plans	36
3.7	The Alternative Energy Future	38
4.0	THE ENERGY CONSUMPTION EXPERIENCE IN HURON COUNTY	40
4.1	Energy Consumption by Fuel, 1982	40
4.2	Energy Consumption by Sector, 1982	41
4.3	Energy Consumption by Municipality, 1982	53
4.4	Energy Consumption by Settlement Type, 1982	54
5.0	THE PROSPECTS FOR ENERGY CONSERVATION IN HURON COUNTY	55
5.1	The Settlements	55
5.2	Agriculture	59

1.0 THE PREFACE

1.1 Study Origin

The study was originated by the Huron County Department of Planning and Development and approved by County Council in 1983 as a 1984 Departmental task.

The Study was directed by Dr. Gary Davidson, Director of Planning and Development and undertaken by the association of consultants.

The Study was undertaken within the guidelines of the Ministry of Municipal Affairs and Housing entitled, "Energy Conservation Through Official Plans". The Ministry provided a grant to the County under its "Energy Conservation Through Land Use Planning" program.

The County established the following goals and objectives of the Study.

Goal: To develop and apply an approach to energy conservation that is comprehensive in nature and integrated with the other major planning goals of the County and its local municipalities.

Objectives:

(1) to develop a policy context for energy conservation for the official plans and zoning by-laws for the County and its municipalities;

(2) to develop information and implementation procedures for energy conservation with respect to land use practices, development and redevelopment;

(3) to determine which policies and programs regarding land use planning energy conservation are applicable at the individual, local government and county government levels;

(4) to provide general informational material on the relationship between land use planning and energy conservation for rural and urban municipalities.

1.2 Technical Advisory Committee

The on-going direction of the study was undertaken through meetings of this Committee. The terms of reference were prepared through this Committee and consultant interviews and selection review were made by the Committee.

During the study, the Committee met with the consultant team on 4 separate days.

The members of the Committee consist of the following representatives.

Dr. Gary Davidson, Chairman
Mr. Jim Britnell, Huron County Council
Mr. Harold Flaming, Ministry of Agriculture and Food, Fergus
Mr. Chris Gates, Ministry of Energy, Toronto
Mr. Stu Humphrey, Ministry of Municipal Affairs and Housing, London

1.3 Study Team

The team consisted of the following consultants.

MARK L. DORFMAN, Planner Inc., Waterloo, Ontario
    Mr. Mark L. Dorfman, M.C.I.P.
    Ms. Marion E. Town, B.E.S.

ECOLOGICAL SERVICES FOR PLANNING LTD., Guelph, Ontario
    Mr. Jerome M. Hagarty, P.Ag.
    Mr. Ed Mozuraitis, P.Ag.
    Dr. T. J. Gillespie (Meteorological)

R. J. LONG CONSULTING LIMITED, Orangeville, Ontario
Mr. Robert J. Long, P.Eng.
Mr. David M. Beattie, B.Eng.

Mr. Wayne Caldwell, Huron County Department of Planning and Development assisted the consultant team by obtaining data for the Study.

1.4 Approach to Study

The focus of the Study is energy conservation. Energy conservation objectives are achieved through the practical implementation of official plans, zoning by-laws, other development controls and by municipalities, groups and individuals in the County.

The energy conservation issue is already identified in several documents produced by the Ministry of Energy and the Ministry of Municipal Affairs and Housing in Ontario. There is no attempt in this Study to question the need to conserve or to precisely measure the total current levels of non-renewable energy use in the County or to predict the total energy use in the future for the entire County.

The consultants adopted the techniques and information contained in the 10 Energy Handbooks for Planners produced by the Ministry of Energy as a basis for identifying the physical development issues and to assess energy consumption.

With this understanding of the energy conservation objectives, the consultants framed the planning issues and policies keeping in mind the fundamental principles of the County Official Plan and the needs of the community.

In this way, the County will be realizing the compatibility of planning objectives and energy conservation objectives in one document.

The consultants framed other directions for achieving the energy conservation objectives. These include measures taken by individuals and groups and the municipalities, which are beyond the statutory powers of the County Official Plan and The Planning Act.

The consultants recognize that implementation measures put forward in the Study must also include guidance for continuous monitoring. Monitoring in this context means on-going assessment by the County of the energy conservation objectives and the evaluation of decisions made to implement the planning policies.

The consultants and the County recognize the importance of energy conservation. This realization is stressed by the fact that the Ontario Legislature in The Planning Act, 1983, identified "the supply, efficient use and conservation of energy" as a matter of provincial interest in Planning.

Energy conservation is viewed, in this Study, as an aggressive initiative to alter the community's requirements for non-renewable sources of energy while not prejudicing the continued social and economic development of the community. The act of conserving energy includes:

(a) consciously reducing the overall consumption of non-renewable energy sources such as: electric power; coal, petroleum, natural gas, nuclear power, waste heat; but, maximizing the efficient use of these sources and converting to more abundant and economic non-renewable energy sources; and

(b) planning to shift to the consumption of renewable sources of energy such as: biomass, solar, wind and geothermal.

Inherent in this view of energy conservation is the compatible objective that the efficient use of existing non-renewable sources of energy will minimize the energy waste.

The consultants used a logical sequence of investigation to arrive at the recommended approach to energy conservation. The investigation is fully contained in Volume 2 entitled "Understanding Energy Conservation and Consumption in Huron County". The Study was undertaken in three Phases and the product of each phase became a Chapter or Section in Volume 2.

Phase 1:

(a) The energy consumption and conservation issue in Canada.

(b) Energy terminology.

(c) Renewable energy and alternative fuels.

(d) Energy conservation objectives in Ontario.

(e) Energy consumption in Huron County.

(f) Settlement patterns in Huron County.

(g) Climate of Huron County.

(h) Planning measures and non-planning measures to achieve energy conservation.

Phase 2:

(a) Applicability of planning measures in Huron County.

(b) Level of achievability of planning measures in Huron County.

Phase 3:

(a) Acceptability of planning measures and non-planning measures.

(b) The recommended approach to energy conservation in Huron County.

2.0 DIRECTION OF THE REPORT

2.1 Format

The Report is divided in two parts. Volume 1 sets out the recommended approach to energy conservation policies and programs in Huron County. It stands alone as the consultants' recommendations.

Volume 2 is just as important as Volume 1 and sets out the understanding of the County from an energy conservation perspective. The information in this volume is useful in understanding the direction for energy conservation. People should be able to build on this information and formulate their own approach to energy conservation.

2.2 The Principal Conclusions

(a) This is a planning study and not a technical report on energy consumption, cost and conservation. For this reason, our attention is directed to the County and local municipal official plans and the requirements under The Planning Act.

(b) The County and the local municipalities have already established effective planning policies in their official plans which have been approved by the provincial government. The evolution of planning in Huron County is expected to continue as perspectives change and issues are identified and these official plans will be reviewed from time-to-time.

(c) Energy conservation policies are part of the planning policies in official plans. There is little need to include a separate section or chapter in any official plan which would be principally devoted to energy conservation.

The act of conserving energy should be understood by the public as an integral part of living within the various settlements. The energy conservation principles and the planning principles are complementary.

The 28 planning measures to be included within the official plans and secondary plans are not to be applied in each and every form of settlement within the County. The principle established in this Study is that the act of energy conservation takes various forms depending upon the settlement type.

For example, 22 planning measures apply to the towns and villages in the County and 12 planning measures apply to farm settlements. It is indicative that only 6 of the planning measures are applicable to the non-farm dwellings scattered throughout the County.

(d) In planning, the energy conservation objectives for the County and its settlement types should be enunciated and entrenched in the official plans since this is the most effective statutory basis for confirming objectives in a municipality. Some of these objectives are to be achieved in the short-term and some in the longer term. Therefore, there is a need by the County and the local municipalities to monitor the practice of energy consumption and energy conservation and to periodically review these goals and objectives through public discussion.

(e) It is a paramount principle that the act of energy conservation should not be made mandatory by the County and the local municipalities. This is a choice left to the individuals and groups living and operating within the County.

The purpose of the official plan is to provide guidance for land use planning and development. The Planning Act, 1983 sets out as a provincial interest "the supply, efficient use and conservation of energy".

It is therefore the responsibility of the County and the local municipalities to translate this provincial goal into local goals for energy conservation and efficient use.

(f) In this study, an obvious conclusion worth repeating is that the County's population growth and change is stable. The 1981 Census of Canada population for the County is 56,125 people which is virtually unchanged from the 1976 Census count.

A best-guess estimate of the 1986 population is that it could increase in the 1981 to 1986 period by 3% to 57,800 people. Population growth in Huron County is expected to take place through births within the County rather than people immigrating into the County.

The County is relatively vibrant since approximately 33% of the current population is under the age of 20 years. This implies that if the economy of the County remains productive these people could ultimately live, work and raise families in the County.

It is a general principle that energy consumption in Huron County will increase because of this population trend and confidence in the future.

(g) A second major principle is that 58% of the population live in settlements and rural areas other than the incorporated towns and villages. This pattern has been consistent for at least the last thirty years and it is expected to continue.

Huron County is a characteristic rural agricultural community.

(h) The form and structure of the County and its various settlements will be virtually unchanged for the next decade. Practically 80%, or even 90%, of to-day's housing stock will likely be used fifteen years from now; the farms will essentially have the same buildings and structures in the future although there will continue to be structural changes in animal barns in the next decade.

High-technology innovations such as electronic mail and banking, video-phones, home-shopping, robotics and computerized information may not have as substantive an impact on life in Huron County as it will have in the larger urbanized settlements.

(i) Although Huron County is a strong agricultural area, secondary energy consumed within the farm settlements consists of 28% of the total energy for the County. The next 66% of total energy is consumed in the towns, villages and other settlements within the County.

What is unknown is the amount of secondary energy consumed indirectly through the use of fertilizers and pesticides on the farm. The production of these chemicals in industries located out of the County consumes approximately 80% of its energy in the form of natural gas.

For this reason, energy conservation in the agricultural sector is vitally important.

(j) The techniques to conserve energy and the technology to improve energy consumption in the agricultural sector are now being developed by the industry. Within the next five years the results of research now being undertaken will become available as a choice in Huron County.

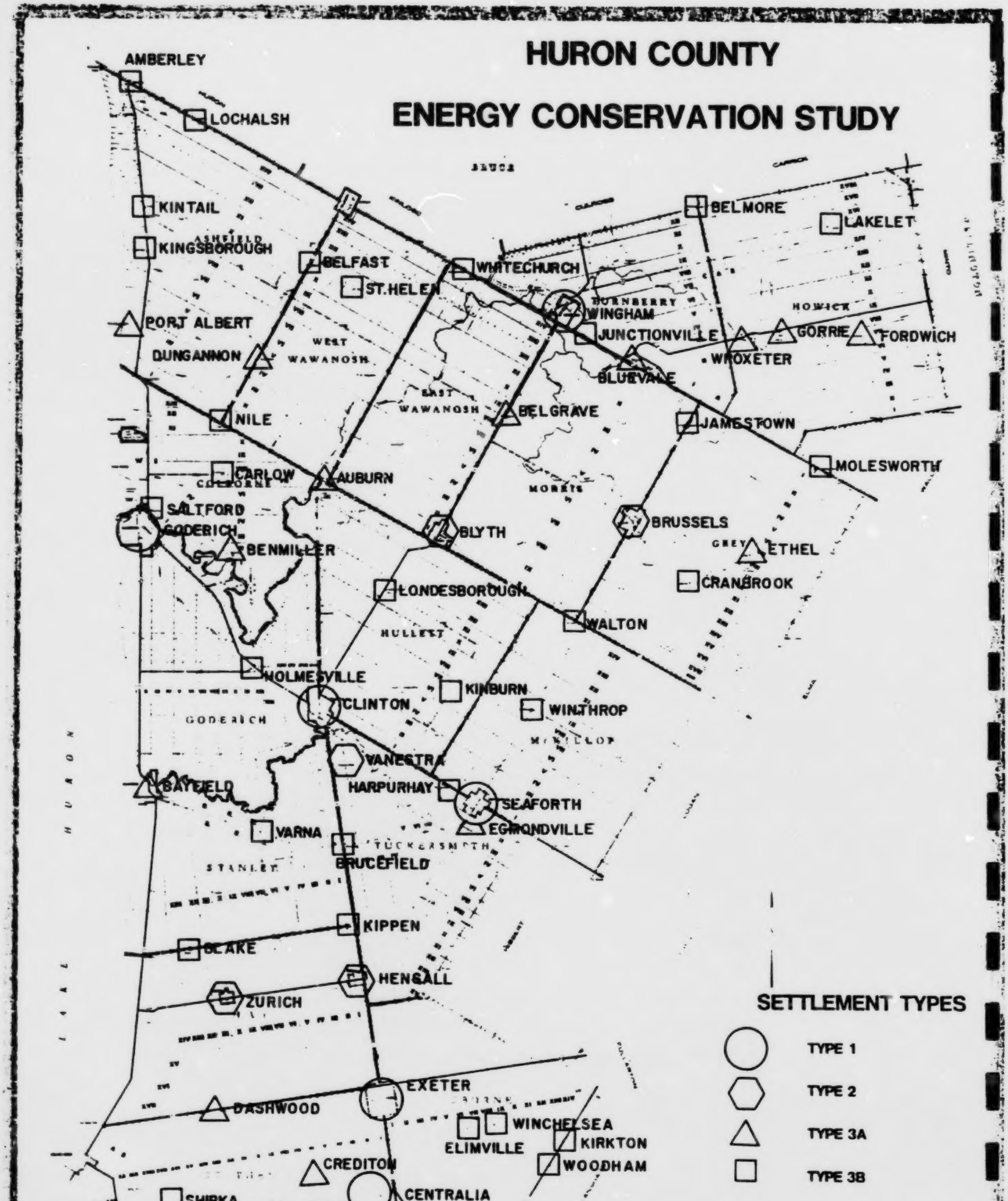
2.3 The Focus of the Recommended Approach

The report investigates energy conservation measures for Huron County. These are predominantly planning measures contained in official plans. Many of the energy conservation objectives can be achieved without plans and zoning by-laws and these non-planning measures are left to the choice of individuals and groups in the County.

The Planning Measures are actions taken by the County of Huron or a local municipality through its jurisdiction under The Planning Act. They are intended to achieve the energy conservation objectives in the County and are adapted from current thinking in the field.

HURON COUNTY

ENERGY CONSERVATION STUDY


AMBERLEY
LOCHALSH
BRUCE
KINTAIL
KINGSBOROUGH
ASHFIELD
BELFAST
ST. HELEN
WHITECHURCH
BELMORE
LAKELET
PORT ALBERT
TURNBERRY
WINGHAM
HOWICK
JUNCTIONVILLE
GORRIE
FORDWICH
DUNGANNON
WEST WAWANOSH
WROXETER
BLUEVALE
EAST WAWANOSH
BELGRAVE
NILE
JAMESTOWN
MOLESWORTH
CARLOW
COLBORNE
AUBURN
MORRIS
SALTFORD
GODERICH
BRUSSELS
BLYTH
BENMILLER
GREY
ETHEL
CRANBROOK
LONDESBOROUGH
WALTON
HULLETT
HOLMESVILLE
KINBURN
CLINTON
WINTHROP
GODERICH
McKILLOP
VANASTRA
HARPURHAY
BAYFIELD
SEAFORTH
EGMONDVILLE
HURON
VARNA
TUCKERSMITH
STANLEY
BRUCEFIELD
KIPPEN
CLAKE
HENSALL
ZURICH
LAKE
EXETER
DASHWOOD
WINCHELSEA
ELIMVILLE
KIRKTON
CREDITON
WOODHAM
CENTRALIA
SHIPKA
HURON PARK
MOUNT CARMEL
CORBETT
GREENWAY
SETTLEMENT TYPES
○ TYPE 1
⬡ TYPE 2
△ TYPE 3A
☐ TYPE 3B

The Planning Measures are divided into three perspectives or structure levels:

A. County level

B. Settlement level (refers to a municipality or to a settlement within a municipality)

C. Site, building design, construction and operation level.

Seven typical forms of settlement have been identified in Huron County and are described as follows. A settlement may include all or part of a municipality. These are included in Level B above.

TYPE 1: Urban Settlement with a broad range of service establishments and institutional use and full municipal services.

TYPE 2: Urban Settlement with a narrow range of economic activities, limited service establishments and institutional uses with full or partial municipal services.

TYPE 3: Settlement which is predominantly residential and has very limited service establishments and may contain institutional uses. Other settlements may consist of residential only. No municipal water and sewer services exist in any of these settlements.

These settlements are subdivided into:

(A) Settlements with 50 or more dwelling units.

(B) Settlements with less than 50 dwelling units.

TYPE 4: Isolated non-farm residential units distributed throughout the County including permanently-occupied units along the Lake Huron shoreline and the Grand Cove area north of Grand Bend.

TYPE 5: A farmstead.

TYPE 6: Seasonal settlements consisting of cottages and commercial recreation. These are located along the Lake Huron shoreline, in Bayfield and throughout the County.

(Refer to Section 6.5 in Volume 2 for list of settlements by type).

The energy conservation approach is a recommendation to Huron County Council and the Department of Planning and Development. The Study terms of reference indicate that the County will decide how and when to implement the recommended approach.

The recommended approach specifically sets out the requirements for an energy conservation initiative in the County. There is flexibility in the approach which allows the County to undertake its programme over several years.

As well, there is an approach directed to the Ministry of Agriculture and Food which touches on the scope of the Food Land Guidelines.

3.0 RECOMMENDED APPROACH TO ENERGY CONSERVATION IN HURON COUNTY

The Recommended Approach to Energy Conservation consists of the following six components:

- The Official Plans
- The Zoning By-law
- Site Plan Control
- Food Land Guidelines
- Outreach
- Continuous Monitoring of Official Plans.

3.1 The Official Plans

(a) The Huron County Official Plan and each of the official plans and secondary plans for the local municipalities should include the following style of Energy Conservation Objectives.

Energy Conservation Objectives

(i) The municipality's short-term objective is to improve energy efficiency in buildings, structures and operations.

As a guideline, the Ontario Government's suggested energy conservation targets should be considered when making choices.

. 25% reduction in energy consumed per unit of industrial output.

. 33% reduction in energy consumed per person kilometre.

. 20% reduction in energy consumed per tonne kilometre.

. improvement of 30% in average household energy consumption efficiency.

. improvement of 20% in energy consumption efficiency in commercial and institutional uses.

. 10% reduction in energy consumed per unit of farm output.

The objective of improving energy efficiency is to be achieved through planning for the physical development of the County and is measurable by the following results:

reduction in person-kilometres for personal transportation.

reduction in per tonne-kilometres for the shipment of industrial, agricultural and commercial products,

energy efficiency in space heating in residential and farm buildings.

energy efficiency in space heating in commercial and industrial buildings.

improvement in efficiency in truck and farm equipment operations.

efficiency in municipal operations such as road maintenance and operation of buildings and servicing plants.

(ii) The municipality's longer-term objective is to achieve the substitution of crude oil products in residential, agricultural, commercial and transportation sectors with other alternative secondary energy forms such as natural gas, propane and electricity, where alternative fuels are cost effective.

In parts of the County, provided with natural gas, this objective is important to the residential, industrial, commercial and agricultural sectors and it is also vital to the parts of the County now unserved by the natural gas distribution system.

(iii) The municipality's on-going and future objective is to achieve the greater utilization of alternative fuels and renewable forms of energy in all sectors. These include wood wastes; water power; forests; plants, crops and organic matter; solar sources and wind energy.

The municipality will encourage the recycling of excess or waste heat in the industrial and agricultural sectors.

(b) All of the existing official plan policies which achieve the energy conservation objectives should be retained within the approved and draft official plans and secondary plans as indicated in the Achievability Index. (Refer to Section 10 in Volume 2).

There are 28 Planning Measures examined in Sections 9 and 10 in Volume 2. They are divided into levels A, B, and C according to the description in Section 2.3 above. In total there are 10 planning measures in level A; 13 planning measures in level B; and 5 planning measures in level C. (Refer to Section 8.2 in Volume 2).

The following Planning Measures are considered acceptable and should be retained as included in the official plans and secondary plans. It is recommended that the new secondary plans for Hullett, McKillop, Morris and West Wawanosh Townships will include similar Planning Measures.

PLANNING MEASURES TO BE RETAINED

A.1 Discourage Sporadic Non-farm Residential Development

A.2 Expand Existing Built-up Areas, Particularly on Major Roads

A.6 Locate Processing and Marketing Areas Close to Product Source

A.9 Intensify Seasonal Settlements

B.4 Concentrate Commercial Development in Nodes and Corridors

B.6 Infilling of Buildings

(c) The following style of policies should be included within existing, proposed and revised official plans and secondary plans. These planning measures are considered to be acceptable in the County. (Refer to Sections 9 and 10 in Volume 2).

(i) COUNTY LEVEL

PLANNING MEASURE A.3

Utilize and Maximize Existing Infrastructure

Include policy in revised Wingham Official Plan to be consistent with other official plans.

PLANNING MEASURE A.4

Preserve Prime Agricultural Land

(a) Strengthen policy in Huron County Official Plan, when it is revised, to specifically preclude non-agricultural uses in the rural area and on prime agricultural land.

(b) Include policy in new secondary plans for Hullett, McKillop, Morris and West Wawanosh Townships to be consistent with other Township official plans. This would apply to farm settlements.

PLANNING MEASURE A.5

Optimize Parcel Sizes for Field Operations

In all official plans and secondary plans, a policy should be included which assesses the reduction in farm size specifically for field operations. There should be a higher priority placed on retaining large parcel sizes for fuel efficient field operations throughout the County.

PLANNING MEASURE A.7

Establish and Maintain Agricultural Service Settlements

(a) Strengthen policy in Huron County Official Plan, when it is revised, to provide that the settlements should be encouraged to be service centres for the agricultural community.

(b) Include policy in new secondary plans for Hullett, McKillop, Morris and West Wawanosh Townships to be consistent with other Township official plans. This policy would apply to the settlements of Londesborough, Kinburn, Auburn (in Hullett); Winthrop (in McKillop); Walton, Belgrave, Jamestown, Bluevale (in Morris); and Belfast, Dungannon, St. Helen (in West Wawanosh).

PLANNING MEASURE A.8

Protect Woodlots

(a) Strengthen policy in Huron County Official Plan, when it is revised, to include energy conservation as an objective for protecting woodlots.

(b) Include policy in new secondary plans for Hullett, McKillop, Morris and West Wawanosh Townships to be consistent with other Township official plans. This policy would apply to farm settlements.

PLANNING MEASURE A.10

Maintain Large, Contiguous Agricultural Areas

(a) Strengthen policy in Huron County Official Plan, when it is revised, to provide that the designated rural areas will be maintained for agricultural (farming) uses and that non-farm uses will be discouraged.

(b) Include policy in new secondary plans for Hullett, McKillop, Morris and West Wawanosh Townships to be consistent with other Township official plans. This policy would apply to farm settlements.

(ii) SETTLEMENT LEVEL

PLANNING MEASURE B.1

Mixed-use Development

(a) Include policy in revised Wingham Official Plan to be consistent with other official plans.

(b) Include policy in Howick Township secondary plan which recognizes mixed use development in the settlements of Wroxeter, Fordwich and Gorrie as acceptable to achieve energy conservation objectives.

(c) Include policy in Bayfield official plan which recognizes mixed use development as acceptable to achieve energy conservation objectives.

(d) Include policy in Ashfield, Colborne, Goderich, Hay, Howick, Stanley and Stephen Townships secondary plans which recognizes mixed-use development as part of seasonal settlements.

PLANNING MEASURE B.2

Increase Residential Densities

(a) Include policy in revised Wingham Official Plan to be consistent with other official plans.

(b) Include policy in Colborne Township secondary plan which recognizes increased residential densities in the Benmiller settlement as a means of achieving the energy conservation objective.

PLANNING MEASURE B.3

Higher Intensity of Commercial and Industrial Development

(a) Include policy in revised Wingham Official Plan to be consistent with other official plans.

(b) Include policy in new secondary plans for Hullett, McKillop, Morris and West Wawanosh Townships secondary plans to be consistent with other official plans. The policy is particularly acceptable in the settlements of Auburn, Belgrave and Bluevale.

(c) Revise secondary plans for Ashfield, Colborne, East Wawanosh, Grey, Tuckersmith and Turnberry Townships to recognize commercial and industrial development as achieving energy conservation objectives. This policy would therefore apply to Dungannon and Port Albert; Benmiller; Auburn and Belgrave; Ethel; Egmondville; and Bluevale.

PLANNING MEASURE B.5

Provide Local or Neighbourhood Convenience Commercial

Revise Clinton Official Plan to allow local convenience commercial uses in residential areas of settlement.

PLANNING MEASURE B.7

Re-use and Conversion of Existing Buildings and Redevelopment of Land

(a) Include policy in revised Wingham Official Plan to be consistent with other official plans.

(b) Include policy in Ashfield, Colborne, East Wawanosh, Grey, Howick, Stephen, Tuckersmith, Turnberry Townships secondary plans and the Bayfield Official Plan which recognizes the re-use, restoration and conversion of buildings and the redevelopment of land as achieving the energy conservation objective. This policy would apply to Dungannon and Port Albert; Benmiller; Auburn and Belgrave; Ethel; Fordwich, Gorrie and Wroxeter; Dashwood, Centralia, Crediton and Huron Park; Egmondville, and VanEstra; and Bluevale.

PLANNING MEASURES B.9 AND B.10

Walking and Bicycle Paths

Include policy in Blyth, Brussels, Exeter, Zurich and revised Wingham official plans to recognize walking and bicycle paths in settlement design as a means of achieving the energy conservation objective.

PLANNING MEASURE B.11

Internal Street System Limits

Include policy in Brussels, Exeter, Zurich and revised Wingham Official Plans to recognize the integration of internal street system limits in residential areas as achieving the energy conservation objective.

PLANNING MEASURE B.12

Joint Use of Public Facilities

(a) Revise policy in Bayfield, Blyth, Hensall and include policy in revised Wingham official plans to provide for joint use of public facilities.

(b) All Township official plans should include a policy to provide for joint use of public facilities where feasible in all settlements.

PLANNING MEASURE B.13

Allow Home Occupations

(a) Strengthen policy in Huron County Official Plan to provide for home occupations in rural settlements.

(b) Include policy in all Township secondary plans to provide for home occupations in all settlements including rural settlements, subject to zoning by-law regulations.

PLANNING MEASURE B.14

Provide Localized Recreational Areas

Strengthen policy in Huron County Official Plan and Township secondary plans to provide for local parks, open spaces and recreational areas, other than campgrounds and cottage areas.

(iii) SITE, BUILDING, DESIGN AND OPERATIONS LEVEL

PLANNING MEASURE C.1

Orientation of Lots, Buildings and Streets with Respect to Sun and Wind

All official plans should provide guidelines for orientation within all land use designations. The Clinton, Goderich and Seaforth official plans should be revised.

The guidelines for orientation should follow the style set out in Section 10 of Volume 2 for this Planning Measure. It is required that the subsequent development control review including the zoning by-laws would conform to these guidelines.

The guidelines should not form a specific energy conservation section in the official plan but should be part of the site design policies contained in the official plan or secondary plan.

PLANNING MEASURE C.2

Landscaping and Buffering of Houses and Roads

All official plans should provide guidelines for landscaping and buffering within all land use designations. The Blyth, Clinton, Goderich, Hensall and Seaforth official plans should be revised.

The guidelines for landscaping and buffering should follow the style set out in Section 10 of Volume 2 for this Planning Measure. It is expected that subsequent site plan control and development review would conform to these guidelines.

The guidelines should not form a specific energy conservation section in the official plan but should be part of the site design policies contained in the official plan or secondary plan.

PLANNING MEASURE C.3

Solar Access Protection

All official plans and secondary plans should establish the policy that solar access should be protected. In setting forth the principle, then it will be possible to include provisions in zoning by-laws and zoning by-law amendments to provide for solar access protection.

It is recommended that provisions for solar access be achieved as a development is considered for approval. It would be onerous and impossible to pass comprehensive zoning by-laws which attempt to cover every eventuality.

The policy in the official plan and secondary plans allow the municipal council and the committee of adjustment to provide for solar access protection. The principles of merit are:

(a) Allow for variable setbacks from front,rear and side lot lines depending upon orientation of street and lot.

(b) Allow for variable building heights depending upon orientation and relationship to the heights of adjacent buildings.

(c) Allow for variances to zoning by-law provisions for the encroachment into various yards of front porches required to create air locks; greenhouses or sunrooms; solar equipment or windmills.

(d) Allow for variances for reduced lot widths. This would give guidance to the Committee of Adjustment in determining consistency with intent of the official plan.

Guidelines for solar access protection should be prepared by the County for use in development control. The guidelines include the methodology for establishing sun shadows and the resulting building envelope. There are several publications which effectively illustrate these principles and can be easily adapted for the County.

PLANNING MEASURE C.4

Clustering of Buildings

(a) The official plans for Bayfield, Blyth, Brussels, Clinton, Exeter, Hensall, Zurich and Wingham should include a policy to provide for the clustering of new residential dwellings.

PLANNING MEASURE C.5

Minimum Property Standards

There is no clear direction on whether a standard for maintenance and occupancy can be utilized by the local municipality to require the application of energy conservation measures in repair of buildings. Any additions or construction of an existing building would nevertheless need to comply with the provisions of the Ontario Building Code.

There is no recommended approach with respect to this measure and the legal basis should be monitored by the County in the future.

3.2 The Zoning By-law

(a) Each comprehensive zoning by-law should contain definitions regarding "altitude" and "azimuth".

(b) Each comprehensive zoning by-law should include in its definition of "height" that, except for farm buildings and structures, the height is measured to the highest point of the building or structure.

(c) Each comprehensive zoning by-law should permit solar collectors to exceed the building height limitations.

(d) In drafting zoning by-law amendments, the municipality should consider the applicability of incorporating measures for solar access protection. These include specific building heights; spacing between buildings and setbacks; lot frontage and depth; lot coverage of building or structure.

3.3 Site Plan Control

(a) In designating certain areas for site plan control within the official plan, there should be a complementary statement which sets out the objective of achieving energy conservation using a site plan control by-law.

(b) Since site plan control by-laws passed under Section 40 of The Planning Act, 1983 cannot be utilized to regulate the height and density of buildings and structures, they can be utilized to provide landscaping and buffering, where it is appropriate on the site.

(c) The application of site plan control to achieve energy conservation is limited to the one requirement. However, in reviewing development applications, the local municipality and the landowners should keep in mind the energy conservation objectives and build these features into the site design.

3.4 Food Land Guidelines

(a) The Food Land Guidelines of 1978 establishes the requirement for municipalities to protect the agricultural land base for the long-term security of farming. In Huron County, the official plans and secondary plans incorporate these principles.

(b) The existing Food Land Guidelines are not intended to focus on energy conservation within the agricultural settlement. However, the principles in the Guidelines and the corresponding official plan and secondary plan policies support energy conservation.

Although conventional space heating costs for the typical house are similar for units located within settlements or developed sporadically in agricultural areas or on the farm, the significant energy cost differences relate to transportation. Data in Section 5.4 indicates that the annual transportation energy cost of a non-farm house in the agricultural settlement may exceed a similar house located in a town or village by as much as 18 times. By protecting the rural land base, the larger farm parcels used for field operations encourage lower per unit energy costs for farmers.

There are eight relevant Planning Measures supported by the Food Land Guidelines in so far as the municipality has built-in a screening process for decisions. These measures are:

A.1 Discourage sporadic non-farm residential development.

A.2 Expand existing built up areas, particularly on major roads.

A.4 Preserve prime agricultural land.

A.5 Optimize farm size for field operations.

A.6 Locate processing and marketing close to product source.

A.7 Establish and maintain agricultural service settlements.

A.8 Protect woodlots.

A.10 Maintain large, contiguous agricultural areas.

(c) Since the Food Land Guidelines do support energy conservation objectives in the agricultural areas, it is suggested that the proposed revision to this document include an appropriate statement in its introductory chapter.

This statement should establish the principle that protecting the agricultural land base achieves energy conservation objectives within the community.

3.5 Outreach

(a) The Director of Planning and Development for the County should continue to be the designated energy co-ordinator.

(b) The purposes of energy co-ordination should be:

- (i) Promote the act of energy conservation in the County through planning measures and non-planning measures;
- (ii) Keep energy conservation in the forefront of public awareness;
- (iii) Inform the public.

(c) To assist the energy co-ordinator, an advisory group should be established by the County. The advisory group should consist of representatives from local municipalities, the local agricultural office, the energy suppliers and local and County interest groups, and farm organizations. The advisory group of volunteers should meet periodically to assist in establishing the energy co-ordinator's program and to establish a network of people who could be able to collect information and provide advice and information to the community.

An advisory group of municipal staff should be established to focus on energy consumption in physical services and to set up a mechanism to collect and analyze data and provide feedback.

It would be advantageous for the advisory group to organize a one-day workshop as its first task in 1984, consisting of the network of interest groups. The workshop's objective is to establish the network and to reach a consensus on energy conservation, by choice in Huron County.

(d) The energy co-ordinator should undertake the following tasks in the capacity as Director of Planning and Development:

(i) Prepare planning guidelines concerning solar access protection; landscaping and buffering of buildings and streets; orientation of lots, buildings and streets.

(ii) Prepare official plan and secondary plan statements pursuant to the recommended approach in this report.

(iii) Draft zoning by-laws and amendments incorporating energy conservation provisions.

(iv) Incorporate energy conservation guidelines into on-going development review procedures.

(e) In 1984, the energy co-ordinator should arrange to place an ENERGYBOX in each of the 28 local libraries within the County. The ENERGYBOX should contain current information publications and research material available from the Ministry of Energy, Mines and Resources; Ministry of Energy; Ministry of Municipal Affairs and Housing; Ministry of Transportation and Communications; Ministry of Agriculture and Food; Ontario Hydro; Union Gas; Canadian Petroleum Association; and the housing industry; Agricultural Energy Centre of O.M.A.F. (See page 62 of Volume 1 for description of Centre).

The energy co-ordinator should periodically keep this information up-to-date rather than be required to write, publish and distribute handbooks and pamphlets. There is a lot of published information which can be obtained from established sources. These booklets and handbooks are designed for the public and are readable. If there are gaps in the publications then the energy co-ordinator should first determine the availability of the information.

Section 11 in Volume 2, includes a listing of a large selection of materials which are now available for inclusion in the ENERGYBOX.

(f) The energy co-ordinator should encourage local municipalities and school boards to examine existing municipal operations and traffic management in order to achieve energy efficiencies. (Refer to Non-Planning Measures B.1 and B.2 in Section 8.3 of Volume 2.)

(g) The energy co-ordinator should provide the six local newspapers, the local farm press and other local publications with source information which informs the community:

(i) how to modify energy consumption; and

(ii) how to achieve certain benefits without as much energy.

This effort could interest the community in undertaking the following Non-Planning Measures: (Refer to Section 8.3 of Volume 2).

- Retrofit existing buildings.
- Improve thermal efficiencies of existing building envelope.
- Upgrade thermal standards of new home construction.
- Improve operations and design technology in industry and on the farm e.g. reduced tillage, heat recovery.
- Ride-sharing.

(h) The energy co-ordinator should arrange to obtain the eleven 1/2 hour video tapes on "Energy Efficient Housing" from the Ontario Ministry of Energy and audio-visual resources from the Agricultural Energy Centre. The co-ordinator should provide the tapes to libraries, service clubs and other groups for self-viewing.

(i) The energy co-ordinator should keep informed of the current federal and provincial grants available to the various sectors within the County and provide this information to the public.

(j) The energy co-ordinator should arrange for technical advisors and speakers at the request of interest groups within the County.

(k) Since the energy co-ordination program is on-going, the energy co-ordinator should provide the public with periodic information on energy consumption and energy conservation achievements within the County and the various sectors. The energy co-ordinator should provide information to municipalities on energy consumption patterns in physical services.

(l) The energy co-ordinator will require a small annual budget for disbursements.

(m) The energy co-ordinator and the advisory group should establish and maintain an on-going liaison with the Ontario Ministry of Energy.

(n) In 1984, the energy co-ordinator should consult with Union Gas Limited to determine the feasibility and planning implications of progressively extending the natural gas infrastructure to other settlements within the County. At this time, only 19% of residential dwellings in the County are served by natural gas. (Refer to Non-Planning Measure A.1 in Section 8.3 of Volume 2.)

Consultation should be undertaken with the Ministry of Energy, Mines and Resources to determine the funding prospects to expand natural gas under the Distribution Systems Expansion Program.

Consultation with Ontario Hydro should be undertaken to consider and examine the electricity pricing structure within the County as an incentive to convert from oil to electricity in the County.

Consultation with fuel oil suppliers to consider a mechanism to provide improved energy efficiency in oil heating systems in the County.

(o) The energy co-ordinator should, in the long-term, establish the changing capability of alternative fuels and renewable energy sources within the County. (See Non-Planning Measure C.5 in Section 8.3, Volume 2.)

(p) The energy co-ordinator can enhance the work of the Agricultural Energy Centre in the County by encouraging local farmers to enquire into demonstration projects and to monitor how effectively or extensively individuals and farm organizations in the County are utilizing the resources available through the Centre.

3.6 Continuous Monitoring of Official Plans from the Energy Perspective

(a) The recommended approach for the official plan in this Study constitutes a review by the consultants of the official plans and secondary plans from the energy conservation perspective. This review has been based on monitoring certain assumptions within the existing plans and the awareness of the need for energy conservation within the County.

(b) The County and the local municipalities should establish a procedure to continually monitor the energy conservation issue. Part of this monitoring should occur through the outreach programme. At least, the feedback to the community should identify the state of energy consumption and conservation and its acceptance.

(c) Periodically, there will be a need to revise the official plans and the secondary plans for various reasons. Part of the revision includes the re-examination of the energy conservation objectives and the planning measures in the plans to achieve energy conservation.

(d) The Planning and Development Department should assess the effectiveness of the planning policies and how the development review process is spontaneous to energy conservation objectives.

The recommended energy conservation objectives will change as a reflection of the national energy issue and the energy policies adopted by the federal and provincial governments. It is possible that the provincial government may publish a policy statement on energy consumption and conservation pursuant to The Planning Act, 1983 and this may cause changes in the official plans.

(e) The study has identified a problem with data on energy consumption. The best data is provided by Ontario Hydro. The next best data is provided by Union Gas. There is no accurate data on oil product or propane consumption in the County. The energy co-ordinator should discuss this data problem with these suppliers and gain their confidence in providing the most current data, even if it applies to the previous year.

The energy co-ordinator should monitor the price of each energy type per unit for comparison purposes.

Over the years, there should be a conscious attempt to assemble the consumption and conservation data for each of the settlement types within the County.

(f) The Planning and Development Department should establish a procedure whereby a monitoring report on energy consumption and energy conservation should be submitted to County Council and the local municipal councils and the public for information at least once every two years.

These reports would form part of the documentation required to determine the need for a revision of the official plans as contemplated in Section 26 of The Planning Act, 1983 and whether proposed changes in planning policies would be acceptable to the community. The need for revision is to be undertaken at least once in a 5-year period.

The recommended approach to the official plan changes could form part of the first set of revisions to the official plans and secondary plans.

(g) The Planning and Development Department should revise planning policies based on monitoring where new settlements are established or where existing settlement types change classification.

3.7 The Alternative Energy Future

(a) There is an indication that alternative energy sources such as wood and waste products are used in the County.

(b) The shift to alternative fuels and to the use of renewable sources of energy depends upon the advances in technology. The County should monitor the changes in this technology particularly in the agricultural sector. As well, prices for electricity should be monitored to establish its competativeness.

(c) The Ontario Government suggests that by the end of this century, renewables will consist of 20% of total secondary energy consumption. The County can only promote these changes to the extent that they are applicable in Huron County.

(d) The County should explore the prospects of resource recovery and re-use as a fuel. The most promising prospect is in municipal waste recovery of either the methane or the combustible garbage itself. On a small-scale, there may be an opportunity.

4.0 THE ENERGY CONSUMPTION EXPERIENCE IN HURON COUNTY

4.1 Energy Consumption By Fuel, 1982

The three conventional forms of secondary energy are estimated for the whole County. In 1982, it is estimated that energy consumption was as follows:

Electricity:	1,806,500 gigajoules* or 501.8 million kilowatt-hours.
Natural Gas and Propane:	1,976,600 gigajoules or 48.6 million cubic metres.
Oil (petroleum and fuel oil:	4,635,350 gigajoules or 125.8 million litres
Total	8,418,370 gigajoules.

Oil, as petroleum and fuel oil, accounts for 54% of the County's consumption which is significantly higher than the average of 40% of the total of the three fuels consumed in Ontario.

Natural gas and propane accounts for 24% of the County's consumption which is significantly less than the average of 39% of the total of the three fuels consumed in Ontario.

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* A gigajoule is a 100 million joules. A joule is a metric measure of the quantity of heat required to raise the temperature of one gram of water by one degree celsius. One joule is equivalent to 0.00095 BTU (British Thermal Units).

Electricity accounts for 22% of the County's consumption which is similar to the average of 19% of the total of the three fuels consumed in Ontario.

Oil consumption is high and natural gas consumption is low in Huron County because of the limited distribution of gas pipelines in the County and the price differential between oil and electricity.

Until such time as the natural gas distribution system is extended or the price of electricity becomes cost effective, the "off-oil" energy conservation objective cannot realistically become the immediate short-term objective in the County in certain parts of the County.

4.2 Energy Consumption by Sector, 1982

In Huron County there are five sectors identified for energy consumption. The farm operation sector has been separated out instead of being included within the industrial sector. The overall Ontario consumption data do not identify farm operations as a separate sector. Tables 4.1 to 4.8 summarize this data.

Residential Sector

This includes the 19,800 farm and non-farm dwelling units and the 3,100 seasonal dwellings within the County.

The residential sector consumes 27% of the total secondary energy in the County. This compares to 20% for Ontario.

It is estimated that approximately 75% of the total energy in houses is used for space heating with the remainder used for water heating, lighting and appliances.

In Huron County, most of the energy consumed in the residential sector consists of oil for space heating. This amounts to 48% of total energy in the residential sector compared to 24% for the Ontario average.

Natural gas consists of 20% of the total energy consumed in the residential sector compared to 50% for Ontario.

Electricity consists of 33% of the total energy consumed compared to 26% for Ontario.

There is evidence that propane is used in some instances for space heating in houses predominantly in the Townships.

In the residential sector, conversion from oil to electricity is evident. Natural gas is mainly used in non-farm dwellings rather than in farm dwellings.

Industrial Sector

This includes the manufacturing, warehousing and processing operations essentially within the towns and villages. There is some industrial use of energy in the settlements within the Townships.

The industrial sector (excluding farm operations) consumes 14% of the total secondary energy in the County. This compares to 36% for Ontario, if a 3% estimate for farm operations is deleted.

It is estimated that most of this energy is used for processing and a small proportion is used for space heating.

In Huron County, most of the energy consumed in the industrial sector consists of natural gas. This amounts to 79% of the total energy in the industrial sector compared to 55% for Ontario if coal is not considered. Natural gas is available to the settlements of Goderich, Clinton, Seaforth, Hensall, Exeter, Centralia and Huron Park.

Electricity consists of 19% of the total consumption in industry compared to 28% for Ontario.

Oil (petroleum) is the least with 2% of the total energy compared to 17% for Ontario.

Commercial Sector

This includes all of the retail, wholesale, institutional and government buildings including education.

The commercial sector consumes 15% of the total secondary energy in the County compared to 16% for Ontario.

The energy is used mainly for space heating of buildings.

In Huron County oil (petroleum) consumption amounts to 17% of the total energy compared to 22% for Ontario.

Electricity consists of 49% of the total consumption compared to 30% for Ontario.

Natural gas consists of 34% of the total consumption compared to 48% for Ontario.

Transportation Sector

This includes all of the on-road movement of cars and trucks originating within the County. A precise estimate is impossible to produce however, the Ontario pattern has been determined to represent Huron County.

Transportation consumes 25% of the total secondary energy in the County.

Oil (petroleum) consists of 95% of the total energy used in transportation with 5% of the total consumed as propane (liquid natural gas).

Farm Sector

This includes farm processing, space heating of barns and on-farm machinery such as tractors. An estimate of consumption in greenhouses cannot be made.

The farm sector consumes 14% of the total secondary energy in the County compared with 3% as estimated for Ontario.

Oil (petroleum) consists of 94% of the total energy consumed on farms with electricity amounting to 6%, exclusive of farm houses. There is no comparative estimate for Ontario.

It is assumed that very little natural gas is used on the farm and it is impossible to obtain an estimate of propane consumption.

TABLE 4.1

ENERGY CONSUMPTION IN HURON COUNTY, 1982

Sector	Total	Fuel			
		Coal	Gas	Electricity	Oil
Industrial	14%	-	11%	3%	-
Transportation	25%	-	1%	-	24%
Residential	32%	-	6%	11%	15%
Commercial	15%	-	6%	7%	3%
Farm	14%	-	-	1%	12 %
Total	100%	0	24%	22%	54%

Sources of Data

Union Gas Limited
Ontario Hydro
Ministry of Energy. Guide to Community Energy Profiling.
Ministry of Energy. Estimating Energy Consumption for New Development.
Ontario Energy and Agriculture Policy Committee. Volume 2. Summary of Research Findings.

TABLE 4.2

ENERGY CONSUMPTION IN ONTARIO, 1982

Sector	Total	Fuel			
		Coal	Gas	Electricity	Oil
Industrial (includes Farm production)	40%	11%	16%	8%	5%
Transportation	24%	-	1%	-	23%
Residential-Farm	20%	-	10%	5%	5%
Commercial	16%	-	8%	5%	3%
Total	100%	11%	35%	18%	36%

Sources of Data

Statistics Canada. Quarterly Report on Energy Supply/Demand in Canada. 4th Quarter, 1982.

TABLE 4.3

ENERGY CONSUMPTION, HURON COUNTY, 1982

Sector	Total	Fuel		
		Gas	Electricity	Oil
	GJ	GJ	GJ	GJ
Industrial	1,145,400	902,800	216,800	25,800
Transportation	2,103,900	105,200	-	1,998,700
Residential	2,745,900	537,200	901,700	1,307,000
Commercial	1,268,600	431,400	620,800	216,400
Farm	1,154,600	-	67,200	1,087,400
TOTAL	8,418,400	1,976,600	1,806,500	4,635,300

TABLE 4.4

ENERGY CONSUMPTION, RESIDENTIAL SECTOR, 1982

	HURON	ONTARIO
NATURAL GAS including propane	20%	50%
ELECTRICITY	32%	26%
OIL PRODUCTS	48%	24%
TOTAL	100%	100%

DATA NOTES

1. Residential units by type of space heating and water heating systems derived from Census of Canada, 1981. Report SDW81B15. Occupied Private Dwellings by Main Type of Heating Equipment.
2. Natural gas data from Union Gas Limited.
3. Electricity data from Ontario Hydro.
4. Oil products data estimated according to Table 6 in Guide to Community Energy Profiling.
5. Residential Sector includes seasonal units and farmhouses.

TABLE 4.5

ENERGY CONSUMPTION, COMMERCIAL SECTOR, 1982

	HURON	ONTARIO
NATURAL GAS	34%	48%
ELECTRICITY	49%	30%
OIL PRODUCTS	17%	22%
TOTAL	100%	100%

DATA NOTES

1. Natural gas data from Union Gas Limited.
2. Electricity data from Ontario Hydro.
3. Oil products data estimated according to Table 7 in Guide to Community Energy Profiling.

TABLE 4.6

ENERGY CONSUMPTION, INDUSTRIAL SECTOR, 1982

	HURON	ONTARIO
COAL	-	26%
NATURAL GAS	79%	41%
ELECTRICITY	19%	21%
OIL PRODUCTS	2%	12%
TOTAL	100%	100%

DATA NOTES

1. Natural Gas data from Union Gas Limited and estimated according to Table 5 in Guide to Community Energy Profiling.
2. Electricity data from Ontario Hydro.
3. Oil products data estimated according to Table 9 in Guide to Community Energy Profiling.

TABLE 4.7

ENERGY CONSUMPTION, TRANSPORTATION SECTOR, 1982

	HURON	ONTARIO
PROPANE	5%	5%
OIL PRODUCTS	95%	95%
TOTAL	100%	100%

DATA NOTES

1. Distribution assumed similar to Ontario experience.

TABLE 4.8

ENERGY CONSUMPTION, FARM SECTOR, 1982

	HURON
ELECTRICITY	6%
OIL PRODUCTS	94%
TOTAL	100%

DATA NOTES

1. Energy consumption factors in GJ per hectare for farm production and GJ per animal unit for livestock and poultry derived from Volume 2 of Ontario Energy and Agriculture Policy Committee.
2. Data on hectares and animal units derived from Census of Agriculture, 1981, produced by Statistics Canada.

4.3 Energy Consumption by Municipality, 1982

The distribution of energy used in the residential, industrial, commercial and farm sectors indicates a generally even split between towns and villages as a group and townships as a group.

The following table illustrates the percentage distribution for total secondary energy consumption.*

Towns and Villages	%	Townships	%
Clinton	5.6	Ashfield	3.1
Exeter	6.0	Colborne	2.3
Goderich	21.6	E. Wawanosh	1.6
Seaforth	3.5	Goderich	3.8
Wingham	4.3	Grey	2.8
Bayfield	0.8	Hay	2.9
Blyth	1.2	Howick	3.8
Brussels	1.4	Hullett	3.1
Hensall	3.1	McKillop	2.6
Zurich	0.9	Morris	2.3
		Stanley	2.9
Total	48.3%	Stephen	10.0
		Tuckersmith	4.4
		Turnburry	1.8
		Usborne	2.7
		W. Wawanosh	1.6
		Total	51.7%

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* Includes secondary energy fuels used in residential, commercial, industrial and farm sectors.

4.4 Energy Consumption by Settlement Type, 1982

The distribution of energy used in each settlement type indicates that 66% of the energy applies to the non-farm settlements (Types 1, 2, 3A and 3B).

The farm settlements (houses and farm production) consume 28% of the total secondary energy in the County.

The remaining 6% of the energy is consumed by the scattered non-farm dwellings and cottages.

The energy used in these settlements includes residential, commercial, farm and industrial purposes. Transportation use is not designated by settlement type.

Settlement Type*	Total Energy GJ**	Percentage
1. Urban	2,787,100	44.1%
2. Urban, limited	496,700	7.9%
3A. Settlements with 50 or more dwellings	778,400	12.3%
3B. Settlements with less than 50 dwellings	113,790	1.8%
4. Scattered dwellings	329,000	5.2%
5. Farm	1,779,160	28.2%
6. Seasonal	30,330	0.5%
Total	6,314,500	100%

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* See Section 2.3, Volume 1 for description of Settlement Types.

** GJ = Gigajoules.

5.0 THE PROSPECTS FOR ENERGY CONSERVATION IN HURON COUNTY

5.1 The Settlements

There is no assurance that the supply of energy will be secure at any time in the future. So much is dependent upon domestic and foreign policies

Since we cannot predict the future supply of conventional energy sources, it is therefore prudent to be cautious and to conserve.

Similarly energy prices are regulated by government. There is no assured energy price level for conventional energy. It is therefore unwise to establish price targets in the short term and to predict the relative prices between electricity, natural gas, oil and propane.

1. Residential Sector

(a) This Study has not attempted to produce an energy audit for the County. Instead, the Study has focussed its attention on the individual's response to energy consumption.

In the residential sector in Huron County, it is more advantageous to undertake a personal energy audit for each housing unit. This would be left to the discretion of the owner or tenant.

The benefit of the audit is a comparative yearly analysis of the cost of total energy consumption in the home. The method of auditing is simply a yearly check on total energy cost taking into account changing energy prices and degree days during the year. The federal government's EnerSave free service can be used by each homeowner.

The analysis is useful to identify the yearly energy consumption savings and the pay-back after undertaking insulation, weatherstripping, caulking, conversions, or other thermal and heating improvements.

(b) In the short-term, there will be relatively small increases in the number of new housing units in the settlements. Growth is not expected at such a pace that large subdivisions and new settlements will be needed. Therefore, the overall energy gains will result from improving energy efficiencies in existing housing.

Nevertheless, the official plans in place can accommodate growth within an energy efficient settlement pattern in the County.

(c) The prospects for energy concervation in housing in all the settlements is measured by the following efficiencies:

(i) insulation of houses including caulking and weatherstripping.

(ii) making sure that existing heating systems are maintained to increase efficiency.

(iii) converting from oil to electricity or to natural gas. The federal grants are still in existence and should be used.

(d) The residential community should be positively reminded of the benefits of efficient energy use. This will become a matter of conventional life-style rather than a penalty.

This is the target group for the energy co-ordinator's Outreach programme.

(e) There will be continued use of wood for heating and the adaptation of houses or parts of houses to solar. It will become clear that high-technology is not required to take advantage of these renewable energy sources.

2. Industrial and Commercial Sector

(a) Industries have already made improvements in efficiency of operations. This is an economic fact of life and this will continue. Industries could ask the Ministry of Energy to bring the Energy Bus to the County to analyze individual company consumption.

(b) Commercial use of energy is varied and conservation depends upon efficiency for space heating, lighting and air conditioning and the conversion to alternative fuels. Through continued demonstration these reductions in input will change.

(c) Institutions and governments are progressively funding efficient methods of consuming energy. Technology such as heat exchangers and solar collectors are being retrofitted to existing buildings.

3. Transportation Sector

(a) In a large county like Huron, travel by car is essential and will continue to be important to the life-style of individuals and families. A pattern of travel has developed and will not dramatically change.

(b) Improvements such as combination trips to work and shopping should be encouraged as a means of reducing person kilometres in total.

(c) Converting gasoline engines to propane is an advantage and financial encouragement from government is available. Propane dealer locations are continuing to expand within the County.

(d) The trend to smaller domestic cars and more efficient cars is continuing. Maintaining the efficiency of all cars is important.

(e) School bus routes are essential in the County and are most efficient. Some buses are being converted to propane and more conversions should occur.

(f) Truck operators - commercial and industrial - are exposed to efficient operation and up-keep. Shorter haul trucks are being converted from gasoline to propane.

4. Agricultural Sector

(a) The agricultural sector will make significant progress in energy consumption. With increased awareness of productivity increases farmers will learn and understand how to maximize energy inputs.

(b) The research and demonstration projects will start paying off within the next 5 years. In fact, farmers as business people will respond positively to the energy question and become very supportive. The provincial government may find it practical under these circumstances to establish energy objectives for the agricultural sector.

5.2 Agriculture

Due to its prominent agricultural characteristics, Huron County can contribute substantially to its goal of energy conservation by working with the agricultural sector and encouraging efficient energy management on the farm.

Planning measures directed at discouraging sporadic non-farm residential development, or maintaining the continuity of agricultural areas and generally preserving prime agricultural land provide an opportunity at the official plan level for the County and its local municipalities to maximize energy savings by implementing sound resource management principles. Policies to preserve agricultural resources in the Food Land Guidelines and embodied in official plans are supportive of energy conservation objectives.

Much of the effort in energy conservation in the agricultural sector must be directed at the operational and design aspects of the individual farm operation. These are the non-planning measures addressed in this study. The site specific measures available on the farm are evolving quickly with testing and new research findings and data leading to improved, refined or new techniques or equipment and devices continually coming on stream. In this dynamic climate of rapidly evolving technology, the County can play an important role in encouraging and enhancing the flow of information to the farmer. Once the positive cost-benefit of specific conservation measures is demonstrated or proven, voluntary implementation will follow.

If the County is to be successful in the role of assisting in or enhancing technology transfer, it is important that it be aware of some of the principles governing the acceptance of information in the agricultural sector. Discussions with O.M.A.F. extension personnel suggest that the following general guidelines apply:

(i) There is much 'fear of the unknown' involved in new technology. Literature may spark interest but practical demonstration projects on the farm will be most convincing. Once interest is attracted by proven results, implementation will be dependent upon ensuring the user has ready access to more information, advice and assistance relevant to his specific application. The bulk of this assistance can be derived from the local O.M.A.F. office;

(ii) Farmers are most convinced by unbiased reporting on the attributes of new techniques or equipment, as may be derived from those colleagues who have some experience in the practical application of new measures in an on-farm situation. Once a new procedure, device or energy management approach is shown to be operational in a local farm setting, and is endorsed by the farmer, it can expect wider acceptance and application;

(iii) Practicality is a foremost consideration. Demonstrating cost-benefit without some management time analysis can be misleading. Although energy savings may be occurring inputs in terms of maintenance, fine-tuning and continual refinement may be off-setting;

(iv) Working with common interest groups in the distribution of information can be most effective since it allows the subject matter to focus on specific concerns. For example, a cash cropper will not be interested in a presentation which deals with heat recovery from milk;

(v) Topics should be current, (i.e. taking advantage of the most recent research available) and seasonally relevant. For example heat exchangers and insulation are popular topics in the fall while soil conservation and tillage experimentation attracts the most attention in the spring;

(vi) It is generally more acceptable to the farming sector to speak of efficient energy management than to stress energy conservation which has a less positive meaning to the farmer; and

(vii) The farmer is generally more interested in increased production than cost savings. Topics focussed on or oriented towards production will attract the most attention and can then provide an opportunity for introducing energy management as a related topic.

The information available on the subject of agricultural energy use is vast. Due to the research emphasis in this area, updating the information is a formidable task. In recognition of this, the provincial government has established the Agricultural Energy Centre under the Plant Industry Branch of the Ontario Ministry of Agriculture and Food. This organization is centred in Guelph and has 9 field personnel setting up and monitoring energy and agriculture demonstration projects throughout the province.

The Canada Department of Agriculture is primarily involved in research and product development while the provincial ministry places considerable emphasis on applications testing in the field, and extension. The Canadian Federation of Agriculture (C.F.A.) is attempting to persuade Agriculture Canada to establish a Canada Farm Energy Service which would provide farmers with energy consumption standards by representative farm types in various regions in order that individual farm operators can compare their performance with the established norm.

To avoid redundancy and to maximize the County's efforts in its role of energy conservation, it is important that it be aware of the resources available through the Agricultural Energy Centre. Briefly the Centre can be described as follows.

- centred in Guelph with field staff spread throughout the Province

- funded through the Ministry of Energy with which there is direct liaison. The Centre has a proposed two million dollar annual budget allocated to basic research (50%); on-farm demonstration projects (25%) and improved greenhouse design and renovation (25%).

- produce and assemble a body of information (Fact Sheets and supporting technical research papers) which is made available to potential users;

- concentrate on research and demonstration activity with primary function of extension assigned to local agricultural offices, through which most informational inquiries are channelled;

- responsible for regular publication of energy topics of current or seasonal interest in the farm press and for keeping press aware of local demonstration projects;

- funding for basic research is available to the University of Guelph and the various technical colleges such as Centralia, and Ridgetown;

- funding for demonstration projects goes toward field staff time and for financial assistance to farmers willing to make some changes in energy management. In return for some risk sharing, the farmer provides the opportunity for operational testing and monitoring of results and for tours and inquiry by interested individuals or groups, (on a prearranged basis);

- successful demonstration projects are documented in research reports from which fact sheets may be developed. Less successful projects are either modified or abandoned;

- the Centre is prepared to interact with farm organizations or interest groups and to participate in their meetings or programs, however they are not equipped to set up meetings; and

- the Centre has audio-visual materials available for meetings including displays, films and literature.

The County's role in enhancing energy conservation efforts in the agricultural sector is primarily supportive. The most useful function the County can provide is one of encouragement through endorsement and policy and secondly to coordinate provincial initiatives within the County. The Agricultural Energy Centre has the momentum and the resources but maintains a provincial focus. The County energy co-ordinator can significantly enhance the work of the Centre in the County by encouraging local farmers to inquire into demonstration projects and generally to monitor how effectively or extensively individuals and farm organizations in the County are utiliziang the resources available through the Centre. Much can be gained by direct communication with the Centre as to the County's specific needs, requirements and opportunities for research. We would expect considerable involvement of the local O.M.A.F. office in Clinton in this process of County-Provincial interaction. Research funding should be attracted to the Centrailia College which could then provide a local outlet for information.

Other functions which the County might undertake include the following:

- ensure that there is complete distribution of available Fact Sheets and research papers to increase exposure of the local farm population to the technology of efficient energy management;

- promote the establishment within the County, of demonstration projects set up through the Agriculture Energy Centre and subsequently encourage tours and exposure through press coverage and contact with farm organizations; and

- promote energy topics in the programs of local farm organizations, marketing boards, producer and breed associations and local agribusiness and ensure they are aware of the audio-visual displays and materials and potential resource personnel available through the Agricultural Energy Centre.

By monitoring provincial initiatives and successes outside the County through the literature and assessing local application through interaction with the County O.M.A.F. office, the County office can play a very important role of keeping Huron County on the forefront of energy conservation in the agricultural sector.

ENERGY CONSERVATION, BY CHOICE

An energy conservation approach in Huron County

VOLUME 2

UNDERSTANDING ENERGY CONSERVATION AND CONSUMPTION IN HURON COUNTY

MAY, 1984

Submitted to County of Huron
by
MARK L. DORFMAN, PLANNER INC.
in Association with

ECOLOGICAL SERVICES FOR PLANNING LTD.
R. J. LONG CONSULTING LIMITED

VOLUME 2

TABLE OF CONTENTS

SECTION PAGE

1.0 ENERGY ISSUE: CONSUMPTION AND CONSERVATION 1

1.1 The Energy Crisis 1
1.2 Canada's Crude Oil Dependency 2
1.3 The Canadian Energy Problem and Solutions 3
1.4 The Changing Use of Energy in Canada 6
1.5 What is the Energy Conservation Option? 7

2.0 ENERGY TERMINOLOGY 9

3.0 A NOTE ON RENEWABLE ENERGY AND ALTERNATIVE FUELS 13

4.0 ENERGY CONSERVATION OBJECTIVES: ONTARIO 22

4.1 The Ontario Energy Consumption Experience 22

5.0 CLIMATE OF HURON COUNTY 37

5.1 Temperature 37
5.2 Snow 37
5.3 Wind 38
5.4 Sunshine 38

6.0 SETTLEMENT PATTERNS IN HURON COUNTY 46

6.1 General Description 46
6.2 Agricultural Characterization 47
6.3 The Townships in Huron County 57
6.4 The Settlements in Huron County 62
6.5 List of Settlements by Type in Huron County 65

SECTION PAGE

7.0 ENERGY CONSUMPTION: HURON COUNTY 77
- 7.1 Summary of Energy Consumption 77
- 7.2 Agricultural Energy Consumption Patterns 88
- 7.3 Huron County Agriculture 94
- 7.4 Energy Consumption Experience in Settlements 96

8.0 PLANNING MEASURES AND NON-PLANNING MEASURES 130
- 8.1 A Generalized Listing 130
- 8.2 Planning Measures: Description from Conventional Wisdom 135
- 8.3 Non-Planning Measures 155

9.0 DETERMINING APPLICABILITY OF PLANNING MEASURES 176

10.0 DETERMINING ACHIEVABILITY OF PLANNING MEASURES 180
- 10.1 Meaning of Achievability Level 180
- 10.2 Applicability and Achievability of Planning Measures 182

11.0 SUMMARY OF FOODLAND GUIDELINES, 1978 TO DETERMINE ACHIEVABILITY OF PLANNING MEASURES 227

12.0 SOURCE MATERIAL 233
- 12.1 Energy Crisis and Policy 234
- 12.2 Alternative Energy and Renewables 235
- 12.3 Community Planning and Site Design 235
- 12.4 Agriculture and Energy 237
- 12.5 Outreach 240
- 12.6 Industrial and Commercial Energy Conservation 240
- 12.7 Municipal Operations 241
- 12.8 Transportation and Energy 241
- 12.9 Thermal Efficiency in Buildings 243

TABLES PAGE

5.1 Temperature, Snow, Degree Days by Month 40
5.2 Wind (Mean Speed and Direction) 41
5.3 Wind Frequencies (By Sector and Seasons) 41
5.4 Hours of Bright Sunshine 42

6.1 Livestock - % of Farms and Farm Machinery 54
6.2 Land Use - % of Zone Area and Crops 55
6.3 Specialty Crops - % of Zone Area and Greenhouses 56

7.1 Energy Consumption in Huron County, 1982 78
7.2 Energy Consumption in Ontario, 1982 79
7.3 Energy Consumption Volumes, Huron County, 1982 80
7.4 Energy Consumption, Industrial Sector, 1982 81
7.5 Energy Consumption, Transportation Sector, 1982 82
7.6 Energy Consumption, Residential Sector, 1982 83
7.7 Energy Consumption, Commercial Sector, 1982 84
7.8 Energy Consumption, Farm Sector, 1982 85
7.9 Huron County Residential Dwellings - 1981 Principal Space Heating Fuel 86
7.10 Huron County Residential Dwellings - 1981 Principal Water Heating Fuel 87
7.11 Existing Municipal Data 98
7.12 Energy Price and Space Heating Cost Indices 99
7.13 Personal Transportation and Municipal Services Energy Cost Indices 100
7.14 School Bus Costs Annually 113
7.15 Personal Farm Transportation 114
7.16 Non-Farm One Way Work Trips 115
7.17 Personal Non-Farm Transportation 116
7.18 Annual Transportation Cost Per Unit 117
7.19 Annual Space Heating Cost Table Based on Heating Degree Days 126

FIGURES

5.1 Heating Degree Days 43
5.2 Cooling Degree Days 44
5.3 Total Snow 45

7.1 Annual Space Heating Energy Consumption 123
7.2 Space Heating Energy Cost by Heating Days 125

8.1 Solar Altitude and Azimuth by Season, 43.2°N 149
8.2 Solar Altitude and Azimuth by Season, 44.0°N 150

1.0 ENERGY ISSUE: CONSUMPTION AND CONSERVATION

1.1 The Energy Crisis

In 1974 and 1975, Canadians were concerned with the "energy crisis" in Canada and throughout the western world. This crisis was created by the realization that there was a shortage of crude oil, which was being imported into Canada at higher prices and most importantly, there was no immediate alternative source of energy in Canada to satisfy our demands.

This realization started when O.P.E.C. (Organization of Petroleum Exporting Countries) in September, 1973, raised the world price of crude oil from $3.00 per barrel to $11.00 per barrel and controlled the supply of crude oil to western nations. Canada never belonged to O.P.E.C. which is dominated by the Middle Eastern countries such as Saudi Arabia and Iran.

For Canada, there was the immediate shock since we were then importing 50% of our own crude oil from other countries while at the same time Canada was exporting crude oil from Western Canada to the United States.

In 1973, O.P.E.C. controlled 70% of the world's crude oil reserves and produced 50% of the total volume used in the world. Canada was dependent upon the cheaper foreign crude oil for supply east of the Ottawa Valley rather than using crude produced in Western Canada.

O.P.E.C. undertook three actions:

(a) it set oil prices without regard for the needs of the major oil refining companies in the west such as Esso, Shell, Gulf;

(b) it reduced crude oil production to less than the requirements of the major oil refineries;

(c) it nationalized the oil production facilities in the middle east countries and controlled the shipment of crude oil from the middle east.

1.2 Canada's Crude Oil Dependency

In 1973, crude oil provided 52% (more than half) of Canada's total primary energy supply.

Primary energy supply is the total energy sources produced in Canada and includes crude oil; natural gas; electricity generated by power plants; and coal.

Crude Oil is found in the ground as a liquid and consists of hydrocarbons before it is refined. The refining of crude oil produces secondary energy sources used for industry, homes and transportation, and includes:

- motor gasoline
- fuel oil
- diesel oil
- heavy fuel oil
- other products
  - kerosene
  - lubricating oils
  - asphalt
  - liquified petroleum gas
  - petrochemicals used in
    plastic, paint

In addition to crude oil, Canadians used Canadian natural gas for 23% of its primary energy; electricity for 14%; coal for 10% and renewables such as wood for 1%.

Before the O.P.E.C. shock, Canadian energy supply was thought to be stable, low priced and of unlimited availability. Canadians had the highest per capita energy use in the world mainly because of our cold climate, the long transportation distances in Canada and the heavy use of oil products in our manufacturing industries.

In the pre-1973 days, energy costs to consumers and industry were continually declining at the same time as energy use in Canada increased at an average of 5.6% every year.

The immediate Canadian response in 1973 was to pay Canadian refineries the difference between the higher world crude oil price and the lower Canadian oil price; to export to the United States only what was not needed by Canadian refiners; and to start a public discussion on the solutions to the crisis knowing that Canada would continue to import a significant portion of its crude oil.

1.3 The Canadian Energy Problem and Solutions

By 1976, the "crisis" became a problem of consumption and the debate centred on how Canadians could reduce their energy use. The Government of Canada presented the "Energy Strategy for Canada" which included the targets to:

(a) Reduce imports of foreign crude oil by 1985 to no more than 33% of Canada's needs and supply Canada's energy needs from Canadian resources such as natural gas and electricity. (This was achieved by 1980).

(b) Reduce the average growth rate of energy use by 1985 to less than 3.5% per year through energy conservation. (This was achieved by 1980).

The Canadian Government also stressed the need for energy conservation within the government itself and throughout the country. Energy conservation, as a voluntary action by Canadians, was promoted by an abundance of information for residents and industries; grants for insulating buildings; promoting a reduction in highway speed limits; labeling consumer products according to energy use.

It is obvious that Canadians do not consume crude oil but use the products of crude oil mainly in heating buildings (houses, factories, offices, farms) and in transportation (cars, trucks, airplanes, farm machinery).

By conserving the use of these oil-based fuels, we would thereby reduce the need to import crude oil; by using cars more efficiently or by insulating buildings, we achieve the same result. Another aspect of crude oil conservation, is our ability to convert from oil products to natural gas, electricity or the renewable energy forms such as the sun and wood.

The "problem" for Canadians is understanding how to efficiently use the secondary energy sources which can be made available.

Secondary energy includes the products which we use in our homes, farms, factories, offices, cars, and trucks mainly for space heating and transportation. These are primarily:

natural gas
fuel oil
electricity
gasoline
propane
coal and peat

These are the conventional secondary energy sources however, there are other lesser known or popular sources which are described as unconventional renewables such as:

wind
small-scale hydro
biomass
wood
active solar
wastes

In 1979, the Government of Ontario issued its policy entitled, "Energy Security for the Eighties". The government expressed its concern and proposed that Canada be self-sufficient in satisfying its crude oil demand by the year 1995.

Ontario has committed itself to energy conservation in the following critical areas, as further revised in 1980:

(a) By 1995, a minimum of 37.5% of its primary energy needs are to come from Ontario sources. These are primarily electricity since there are negligible crude oil and natural gas resources in the province.

(b) By 1995, a minimum of 5% of Ontario's energy will come from renewable and recoverable resources such as solar energy and energy from waste.

(c) By 1985, Ontario's average growth rate in energy demand is targetted at 2% per year.

(d) By 1985, Ontario will have a 0% growth rate in the use of crude oil within Ontario.

Finally in 1980, the Government of Canada revised its energy strategy by establishing the more comprehensive National Energy Program. The government firm objectives are to be completely independent from the world oil market (i.e. O.P.E.C.) by 1990 or earlier and to target a 1% decrease in total crude oil consumption per year.

This means energy conservation and a rapid substitution from oil sources to natural gas, electricity, renewable energy and coal. The program also establishes a target of crude oil consumption of no more than 10% of the total energy used in each of the residential, industrial and commercial sectors in each of the Provinces. Oil products will continue to be primarily used in the transportation sector.

Ultimately, the average growth rate in primary energy use is projected at 1.9% per year by 1990.

The results of the Program are expected to produce crude oil use at 27% of total energy use; other projected energy sources are electricity at 32%; natural gas at 23%; coal at 11% and renewables at 7% by the year 1990.

1.4 The Changing Use of Energy in Canada

In the 1973 to 1982 period, Canadians had altered their use of primary energy sources. This results partly from the programs of the Federal and Ontario governments and the fact that Canada has recently experienced a recession with high inflation and low productivity. The following table illustrates the significant reduction in crude oil consumption in the total Canadian consumption in the past 9 years and as projected for the next 8 years.

	Percentage Consumption by Year		
Primary Energy	1973	1982	1990
Crude Oil	52%	43%	27%
Natural Gas	23%	18%	23%
Electrical generation	14%	27%	32%
Coal	10%	10%	11%
Other	1%	3%	7%
Total	100%	100%	100%

1.5 What is the Energy Conservation Option?

Reducing or even eliminating Canada's crude oil imports from O.P.E.C. was and still is, reason enough for Canadians to conserve energy. In the past 10 years, Canadians have learned a lot about the bonuses of conservation and the ability to use other forms of energy to achieve our continued lifestyle. The energy bonus is that it is less expensive to conserve and to switch to renewable energy sources than to spend billions on new technology or to extend the domestic supply of crude oil and natural gas.

The annual rate of total energy consumption in Canada from 1970 to 1982 has declined significantly, particularly since 1979, as shown in the following table:

Year	Total in Pj*	Annual Rate of change
1970	6752	
1971	6986	+3.5%
1972	7505	+7.4%
1973	7889	+5.1%
1974	8252	+4.6%
1975	8183	-0.8%
1976	8487	+3.7%
1977	8771	+3.4%
1978	9044	+3.1%
1979	9366	+3.6%
1980	9483	+1.3%
1981	9315	-1.8%
1982	8906	-4.4%

This interpretation of conservation is based strictly on the gross indication of total consumption and does not tell us very much about how the energy resources were used and in what distribution. The table of numbers tells us about consumption but a measure of conservation will tell us about life-style in our settlements.

---

* Pj a PetaJoule or 10^{15} Joules.

In Canada today, energy conservation has become part of our way of life. Canadians insulate their homes; turn down the thermostat; reduce their speed of driving; convert to natural gas or electricity; minimize driving trips; and make use of solar heat gain through building orientation. These are all conservation measures which have been promoted by governments or have been stimulated through various grants and incentives.

In Canada, we have nudged towards becoming a conserver society which in principle shows an awareness of the efficient use of energy resources and considers longer term objectives. Since 1974, Canadians have chosen a path which includes more efficient energy use; shift from crude oil products to natural gas and electricity; some use of renewable energy sources and alternative energy technologies. We have moved from "more of the same" and mandatory energy consumption and conservation regulations.

The Energy Conservation Agenda for Canada's future has the following objectives.

1. The short-term objective of oil substitution or "off-oil";

2. The on-going objective of improving energy efficiency in buildings, in transportation and in industrial and farm practices and in public services;

3. The longer-term objective of adapting to renewable energy and alternative fuels.

2.0 ENERGY TERMINOLOGY

The following terms are essential in understanding energy and energy conservation. The list is not exhaustive and reference should also be made to the Glossary of Energy Terms published by the Ontario Ministry of Energy.

ENERGY:	Generally defined as the capacity to do work. Energy can neither be created nor destroyed; it can only be converted to other forms of energy. For example, wood to heat; falling water to mechanical energy and then to electrical energy. The total amount of energy in the universe is always constant; only the relative quantities of energy forms are constantly changing.
ENERGY CONVERSION:	In converting one form of energy into another form of energy there is always a loss of energy or energy which is not used. For example, crude oil into gasoline; coal into coke. Energy forms are: kinetic, electrical, heat, chemical, nuclear, sound, light and mass.

CONVERSION EFFICIENCY:	The measure of the efficiency of converting the energy input into useful energy output. This is expressed as a ratio: $\frac{\text{Energy output (useful)}}{\text{Energy input}}$ The more useful an energy form, the higher its quality. Electricity has a very high quality whereas, low temperature heat is a low quality energy form. Every time energy is converted or used, it is changed to a less useful form or less useful energy is available. The energy which is not used is waste heat.
HEAT VALUE:	Heat energy produced is expressed in joules. Joule is the quantity of heat required to raise the temperature of one gram of water by one degree Celsius. The Joule is also equivalent to 0.000948 BTU (British Thermal Units). The following table indicates the heat values for various forms of secondary energy expressed in Terajoules or billion of joules (10^{12}).

PETROLEUM (1000 cubic metres or 1 million litres)	HEAT VALUE (TJ)
Petroleum coke	42.376
Heavy fuel oil	41.727
Diesel and light fuel oil	38.675
Crude oil	38.512
Kerosene	37.676
Aviation turbo fuel	35.934
Motor gasoline	34.656
Aviation gasoline	33.518

NATURAL GAS	HEAT VALUE
1 million cubic metres	37.229 TJ

LIQUID PETROLEUM GAS (1000 cubic metres)	HEAT VALUE (TJ)
Butane	28.600
Liquified petroleum gas	27.100
Propane	25.600
Ethane	18.400

COAL (1000 tonnes)	HEAT VALUE (TJ)
Anthracite	29.527
Canadian bituminous	29.295
Sub-bituminous	19.763
Lignite	15.345

COKE	HEAT VALUE
1000 tonnes	28.830 TJ

COKE OVEN GAS	HEAT VALUE
1 million cubic metres	18.614 TJ

ELECTRICITY	HEAT VALUE
1 Gigawatt hour or 1 billion watt hours	3.600 TJ

METHANOL	HEAT VALUE
1000 cubic metres	18.100 TJ

WOOD	HEAT VALUE
1000 tonnes	10.000 TJ

MUNICIPAL SOLID WASTE	HEAT VALUE
1000 tonnes	11.400 TJ

STEAM	HEAT VALUE
1000 tonnes	2.750 TJ

NOTE:

1 litre of motor gasoline = 34.656 MJ
1 litre of diesel fuel = 38.675 MJ
1 cubic metre of natural gas = 37.299 MJ
1 kilowatt hour of electricity = 3.66 MJ
1 litre of propane = 25.6 MJ

POWER:

This is a measure or rate of how fast energy is being used. The rate of all types of energy conversions are measured in watts.

One watt is equal to 1 joule per second. Conversely, 1 joule = 1 watt-second.

For example, 1 kilowatt hour is equal to 3.6 MJ (1000 watts x 3,600 seconds in one hour).

3.0 A NOTE ON RENEWABLE ENERGY AND ALTERNATE FUELS

In Ontario, in 1982, approximately 14% of energy sources used are renewable and 86% of energy is non-renewable. The energy agenda includes a long-term switch to renewable sources of energy away from the conventional fossil fuels. The Ontario Government predicts that by 1995, approximately 20% of energy sources used will be renewable in the form of water power, waste, biomass and solar.

Renewable energy comes from sources which are continually available or which are replenished in their natural form.

Non-renewable energy comes from finite sources which when depleted will not be available in the future.

Renewable energy sources may be utilized in the longer term to generate alternative fuels for all sectors.

Both the federal and provincial governments are continually funding research and experimentation in renewables and alternative fuels. In the longer term, depending upon the economics and the technology, Ontario will see a growing use of these energy sources.

The following description of current renewables and non-renewables assists in understanding how we can accommodate their use in our settlements.

ENERGY SOURCE	ENERGY PRODUCT	ENERGY USE
A. NON-RENEWABLE		
CONVENTIONAL		
1. CRUDE OIL: fossil fuel which is mainly hydrogen and carbon recovered from oil fields.	petroleum products such as gasoline, fuel oil.	transportation space heating industrial processes.
2. NATURAL GAS: a liquid gas found underground as a hydrocarbon.	natural gas composed mainly of methane. ethane propane butane pentane plus liquified petroleum gas compressed natural gas	space heating transportation The availability of natural gas is dependent upon the location of gas pipeline system. Other gases such as propane are readily transportable. Propane is suitable for rural uses and in seasonal areas.
3. COAL: solid hydrocarbon formed by decomposition and compression. Coal types are anthracite, sub-bituminous, bituminous and lignite.	coal coke liquified coal (methanol) coke oven gas	industrial processes thermal electricity Coal is imported entirely from the United States. There are known deposits of lignite in northwestern Ontario.

ENERGY SOURCE	ENERGY PRODUCT	ENERGY USE
NON-RENEWABLE		
UNCONVENTIONAL		
1. CRUDE OIL in oil sands (synthetic crude) and tar sands.	petroleum products	Supplements conventional crude oil.
2. URANIUM	uranium	Nuclear Electricity The steam output from the Bruce N.P.D. is proposed to be used in heating agricultural and industrial processes.
3. PEAT: high-moisture content fibrous organic material from compacted vegetable and animal fibres found in swampy areas.	peat	industrial processes greenhouse heating

ENERGY SOURCE	ENERGY PRODUCT	ENERGY USE
B. RENEWABLE		
CONVENTIONAL		
1. HYDRAULIC: conversion of falling water into mechanical energy, used to turn electric generators.	hydro-electric power	heating industrial processes This is large-scale development requiring large volumes of water.
2. WOOD: includes sawdust, wood chips and bark and forest waste.	steam methanol ethanol hot air	space heating industrial processes The pulp and paper industry actively uses this form of energy and the principle has been extended to other industries particularly in Northern Ontario. There are experiments with the heating of greenhouses with wood waste.

ENERGY SOURCE	ENERGY PRODUCT	ENERGY USE
RENEWABLE		
UNCONVENTIONAL		
1. BIOMASS: plant wastes, crop wastes, manure, forests and other organics.	liquid fuels such as methanol, ethanol, vegetable oil biogas	heating transportation forest plantations consisting of fast-growing hybrid trees (poplar) can be developed in poorer agricultural areas. Wood used as an energy source. residuals from farm production and crops can be used in the production of fuels for heating and transportation. This can be smaller-scale.
2. ACTIVE SOLAR: use of a device to absorb solar radiation and its transfer to a fluid.	solar energy	hot water heating swimming pool heating grain drying industrial processes The technology exists to use active solar on a small-scale. The application depends upon the need and the cost-benefit.
3. PASSIVE SOLAR: no separate energy use to achieve maximum heat gain.	solar energy	direct gain utilizing sunlight entering building through windows for heating of space. indirect gain utilizing a heat absorbing material which transfers heat to adjacent space.

ENERGY SOURCE	ENERGY PRODUCT	ENERGY USE
4. WIND: conversion of wind energy into conventional energy.	electricity	Wind power technology is being tested for remote settlements. The application on a small-scale is possible however, for energy generation wind speeds must be at least 20 km/h.
5. Small-scale hydro, micro-hydro and mini-hydro: individual and localized electrical generation.	electricity	heating industrial processes Development is dependent upon the location of falling water and the head created. Ontario Hydro is exploring suitable sites. There is potential for small-scale development.

ENERGY SOURCE	ENERGY PRODUCT	ENERGY USE
6. HYDROGEN: derived by electrolysis, it is a high-energy fuel.	electricity	transportation industrial processes The technology is not available for large-scale hydrogen production. The relative cost of an energy source, such as electricity, needed to produce hydrogen is unknown.
7. PHOTOVOLTAIC ELECTRICITY: a device to convert solar energy into electric current.	electricity	The technology has been developed in the space industry. Power can be generated for settlements if the cost is competitive.
8. TIDAL AND WAVE: conversion of tidal cycle into mechanical energy.	electricity	No known potential in Ontario.

ENERGY SOURCE	ENERGY PRODUCT	ENERGY USE
9. GEOTHERMAL: derived from within earth's crust by using steam or hot water.	electricity steam	space heating There is no known potential or experimentation in Ontario.
10. FUSION: the combining of light atoms such as deuterium and tritium.	electricity	The technology is available but experimentation on a large-scale is underway. The inputs in fusion are by-products from the nuclear fission electrical generators.
11. MUNICIPAL WASTE: combustable garbage is burned to produce heat energy.	electricity steam methane gas	There are several experiments underway in Ontario. Energy from waste projects are varied and include industrial and institutional heating, distinct heating.

NOTE: In developing energy systems, there are three potential forms which could be applied in settlements.

(a) Co-generation:	Electricity and heat are produced simultaneously with heat being used as an energy source for the production of electricity or for generating steam or hot water. On a smaller scale, heat generated within barns can be captured by a heat exchanger and used to heat other farm buildings. Surplus heat generated in one process can be used as an energy source in another process.
(b) Energy Cascading:	High temperature electricity produced could be used for low-temperature space heating and subsequently used for other purposes rather than being discarded. Heat pumps are an example of how cascading has been adapted to residential units.
(c) District Heating:	This is a centralized heating system which distributes heat as steam or hot water to a group of buildings within a settlement or part of a settlement. These systems are larger-scale.

4.0 ENERGY CONSERVATION OBJECTIVES: ONTARIO

4.1 The Ontario Energy Consumption Experience

The experience shows that Ontario uses more energy than any of the other 9 provinces and this amounts to 34% of the total primary energy requirement in Canada.

Crude oil provides 35% of Ontario's primary energy requirements, natural gas approximately 23%, and electrical generation at 36%.

However, total secondary energy use in Ontario is recently increasing at a much slower rate than in the pre-1975 period.

In 1982, the estimated use of total secondary energy by four sectors and by fuel was as follows:

		FUEL			
SECTOR	TOTAL	COAL	GAS	ELECTRICITY	OIL
Industrial	40%	11%	16%	8%	5%
Transportation	24%	-	1%	-	23%
Residential	20%	-	10%	5%	5%
Commercial	16%	-	8%	5%	3%
Total	100%	11%	35%	18%	36%

The industrial sector has always used the largest share of secondary energy in Ontario and this distribution has not changed significantly in the past 5 years. However, within each of the four sectors,there have been some significant changes during the last 12 years in the share of secondary energy which is used.

Natural gas and oil products are the predominant secondary energy fuels.

(a) Industrial Sector

The comparative use of secondary energy in 1970, 1975 and 1982 in Ontario is as follows:

Energy	1970	1975	1982
Coal	31%	24%	26%
Natural Gas	32%	40%	41%
Electricity	15%	14%	21%
Oil Products	22%	22%	12%
Total	100%	100%	100%

Because of the oil substitution program and energy conservation, industry has already reduced its share of oil use and switched to electricity and natural gas.

The Ontario Government's oil substitution target for industry is:

> A reduction in the oil share of total secondary energy to 10% by 1990.
>
> This will be achieved mainly through new industries using more efficient processes and other fuels and through the replacement of oil systems in plants with new systems.
>
> It would appear that the oil substitution in industry is substantially completed and needs to be maintained and sustained.

Industry includes the fertilizer and pesticide manufacturers which are part of food production. In fertilizer manufacturing, natural gas accounts for approximately 80% of the energy consumed.

On the farm, crude oil has been used predominantly in grain drying, space heating of livestock buildings and in greenhouses.

The Ontario Government's energy conservation target for industry is:

A 25 percent reduction in energy per unit output by 1985 compared to the 1975 output. This calculation is based on the reduction in energy required to manufacture one unit of production within the factory.

The evidence is that many industries have already surpassed this particular energy conservation target. This was achieved partly through the Industrial Energy Conservation and Oil Substitution Incentive Program which assisted 1,200 companies in Ontario. As well, the Energy Bus program has been used to evaluate energy consumption and conservation opportunities within plants.

The projection is that total secondary energy use of the Industrial sector is to increase to approximately 45% in 1990 from 40% in 1982.

It appears therefore that industries have been successful in reducing relative energy input and in energy efficiency and that the prospects for significant changes are not to be expected or required.

The Ontario Government has not established specific oil substitution targets or energy conservation targets for farms. The Ontario Energy and Agriculture Policy Committee, in 1981, has suggested that a shift from oil consumption can be achieved by 1990 and that a 10% reduction in energy per unit output by 1990 is reasonable.

(b) Transportation Sector

The comparative use of secondary energy in 1970, 1975 and 1982 in Ontario is as follows:

Energy	1970	1975	1982
Natural Gas	0%	0%	5%
Oil Products	100%	100%	95%
Total	100%	100%	100%

The use of propane has reduced the share of gasoline in the past 5 years.

The Ontario Government's oil substitution target for transportation is:

> A reduction in the oil share of total secondary energy to 90% by 1995.

This will be achieved mainly by the switch from gasoline to propane in automobiles. As well there has been a transfer from gasoline to diesel fuel particularly in truck transportation. However, 80% of farm field operations now depend upon diesel fuel.

The incentive to switch to propane is created by the elimination of motor fuel taxes and new vehicles powered by propane are exempt from sales tax. Grants for propane conversion kits are also available. The use of propane as a fuel in automobiles, commercial trucks and farm vehicles is expected to increase.

The Ontario Government's energy conservation target for transportation is:

(a) A reduction of 33% in fuel consumed per person-kilometre between 1980 and 1995 for passenger transportation.

Gasoline consumption has already been reduced in Ontario by a switch to public transit (a minor impact), car pooling, van-pooling and the use of smaller and fuel-efficient automobiles (a major impact). As well, propane conversion has contributed to this reduced gasoline use.

The reduction has been achieved in part because of the increasing gasoline prices at the pump and a corresponding reduction in unnecessary travel by automobile.

(b) A reduction of 20% in fuel consumed per tonne kilometre between 1980 and 1995 for freight transportation.

This will be achieved essentially through improved truck fleet fuel efficiency in the area of idling, engine temperature control and maintenance.

The responsibility is left to the industry to achieve efficiency as a cost saving measure.

(c) An improvement of 10% in energy efficiency by 1983 for the Ontario Government's fleet.

The projection is that total secondary energy use of the Transportation sector is to remain constant at approximately 24% by 1990.

Growth is expected to be moderate in the future because of a reduced population increase, greater use of diesel and propane and more fuel efficient vehicles. There is no significant switch to methanol, ethanol or compressed natural gas as a fuel expected in the next 20 years.

(c) Residential Sector

The comparative use of secondary energy in 1970, 1975 and 1982 in Ontario is as follows:

Energy	1970*	1975*	1982
Natural Gas	34%	30%	50%
Electricity	17%	20%	26%
Oil Products	49%	41%	24%
Total	100%	100%	100%

* The oil share in 1970 and 1975 is overstated and the natural gas and electricity share are understated. Prior to 1976, apartment buildings were considered to be in the commercial sector therefore using natural gas and electricity.

The evidence indicates that there has been a significant shift from oil products to natural gas and electricity in our homes.

The Ontario Government's oil substitution target for residential is:

> A reduction in the oil share of total secondary energy to 10% by 1990.
>
> This will be achieved principally through the conversion of home heating systems from oil to natural gas or electricity.
>
> Although residential uses slightly more oil products compared to the industrial sector, the substitution to other fuels is most significant and this is our greatest challenge.

The main incentive to switch is the cost-savings of other heating systems. However, this incentive was created by the Government of Canada's Canada Oil Substitution Program (COSP) which provides taxable grants for conversion to alternative heating fuels including renewables. A recent count indicates that 160,000 residential units in Ontario have converted from oil heat systems to electricity, natural gas and wood.

The Ontario Government's energy conservation target for residential is:

An improvement of 30% in the average household efficiency by 1995 compared with 1980.

Energy efficiency in the home can be achieved through insulation, lowering thermostats, adding or improving storm windows and storm doors, caulking and weatherstripping. Space heating accounts for 75% of the secondary energy used in the housing unit and this is the main area where energy efficiency is attainable.

It is expected that by thermal upgrading of existing housing units, there will be a total reduction in space heating requirements of 22% by the year 2000. Similarly, new housing design will be improved and heating requirements are expected to be reduced by 33% by the year 2000. As well, physical planning incorporating energy conservation objectives will contribute to further energy reductions.

> The Government of Canada's Canadian Home Insulation Program (CHIP) provides a taxable grant to improve the insulation of older homes. The target is to upgrade 70% of the houses in Canada by 1987.

The projection is that total secondary energy use of the Residential sector is to remain relatively constant in the future. The shift from oil will be picked up mainly by natural gas and electricity with a minor use of alternative fuels and renewables.

The farm residential sector uses approximately 2% of the total secondary energy in Ontario. Within the farm sector, the use of oil products is significantly high at 53% with 25% use of electricity and 22% use of natural gas.

It is apparent therefore that there could be significant gains through an off-oil program in the agricultural sector particularly in Huron County.

(d) Commercial Sector

The comparative use of secondary energy in 1970, 1975 and 1982 in Ontario is as follows:

Energy	1970*	1975*	1982
Natural Gas	32%	51%	48%
Electricity	24%	33%	30%
Oil Products	44%	16%	22%
Total	100%	100%	100%

* The oil share in 1970 and 1975 is understated and the natural gas and electricity share are overstated. Prior to 1976, apartment buildings were considered to be in the commercial sector therefore using natural gas and electricity.

Commercial includes institutional buildings and although there is a noted reduction in the oil share, the distribution in the other fuels is not clear.

The Ontario Government's oil substitution target for commercial is:

> A reduction in the oil share of total secondary energy to 10% by 1990.
>
> This has been achieved principally through the conversion of space heating systems to electricity and natural gas. This has been particularly significant in government buildings at the provincial and municipal levels. As well public institutions have received funding for conversions. There is a continuing need to convert in these buildings.

The Ontario Government's energy conservation target for commercial is:

(a) An improvement of 20% in the energy efficiency by 1995 compared with 1980.

Energy efficiency in commercial and institutional buildings can be achieved by reduced lighting, turning lights off earlier in the evening, shutting down mechanical systems.

It is expected that existing commercial buildings will have a reduced energy consumption of 7% by 1990 and new buildings constructed in the 1980's will consume 33% less energy because of improved building design and space heating and lighting efficiencies.

(b) A reduction of 26% in energy consumed in Ontario government buildings by 1985 compared to 1976.

The projection is that total secondary energy use of the Commercial sector is to decrease to 12% by 1990 compared with 16% in 1982. The commercial sector has always had the lowest energy requirement of all sectors and this will remain in the future. It is expected that total energy requirements in the commercial sector will grow relatively slowly in the future.

(e) Agricultural Sector

There are four main components of the food supply system. They are:

i) production (agriculture);
ii) processing and packaging;
iii) transportarion and distribution; and
iv) food preparation.

Altogether, these components comprise about 12% of Ontario's total energy consumption.[1] Food production on the farm, and processing and packaging are considered part of the Industrial Sector described earlier; transportation and distribution are part of the Transportation Sector; and food preparation is part of the Residential Sector.

As discussed later, the proportion of energy consumption related to agriculture in the Province (3%) may not be characteristic of Huron County, where there is no major urban industrial, commercial, transportation or industrial emphasis and where land use activities centred on agricultural food production dominate.

Agriculture is very energy dependent, with trends toward mechanization resulting in a 500% increase in energy use in the industry between 1940 and 1980. There is also a very strong dependence on crude oil for motor fuels, as well as for fertilizers and the production of agricultural chemicals. Almost half of the energy used in agriculture in Ontario is derived from crude oil. In the past, agriculture has developed on the basis of abundant and relatively inexpensive energy. To remain competitive in the future, the Province has set a priority on energy conservation and oil substitution in the industry.

---

[1] This figure is taken from the "Report of the Ontario Energy and Agriculture Policy Committee" 1981. This Report provides a wealth of information on Provincial agricultural energy targets and objectives, consumption patterns and conservation measures. Unless otherwise stated, statistics quoted herein are derived from that Report and its associated research documentation.

The Ontario Energy and Agriculture Policy Committee (1981) has set out four main overall objectives for agricultural energy management programs including the following:

- to ensure that the Ontario food industry has a secure energy supply;
- to ensure an expanding, competitive, and increasingly energy-efficient agricultural industry;
- to ensure that Ontario agriculture is able to produce the additional food required by an expanding population; and
- to develop ways by which Ontario can become more self-sufficient in both food and energy.

Strategies set out by the Committee to achieve these objectives include the following:

- greater energy efficiency and conservation in food production;
- substitution of alternative fuels for oil;
- protection, better management, and further improvement of Ontario's foodland;
- development of energy production from agriculture; and
- use of reject industrial heat to expand production of vegetables and specialty crops.

These strategies reflect the national objectives set out as part of the "Energy Conservation Agenda" referred to earlier namely

i) "off-oil";
ii) energy efficiency or conservation; and
iii) substitution to renewables and alternative fuels.

The Energy and Agriculture Policy Committee recommended a 20 year energy management program incorporating the above individual strategies. This overall program includes an initial 5 year action plan which concentrates on energy efficiency and conservation, fuel substitution and foodland preservation.

Some emphasis is being placed on Ontario's greenhouse industry which provides 5000 jobs and produces $120 million in annual sales of vegetables and flowers. The Committee believes that the greenhouse industry's use of fuel can be reduced by up to 50%. This emphasis on the greenhouse industry is reflected in further Provincial initiatives including a Report of the Greenhouse Advisory Committee, "An Energy Management Strategy for Ontario Greenhouses", (Ontario Ministries of Energy and Agriculture and Food, November, 1981).

The challenge for agriculture is to reduce its dependency on oil based fuels, fertilizers and chemicals, while at the same time increase production to satisfy demand. While increasing production, agriculture must continue to preserve its land base and protect it from depletion arising from the adoption of more intensive agricultural practices.

Projecting existing trends, it is predicted that the energy requirements for agriculture would be about 30 to 40% higher in the year 2000 than currently. The Ontario Energy and Agriculture Policy Committee believes however, that this predicted increase in consumption can be reduced by approximately 30% between 1985 and 2000 if its program components are successfully implemented.

Individual targets for different aspects of farm operation have been developed by the Committee. In all cases, the potential savings are conditioned by the realization that certain constraints, such as insufficient financial payback, will prevent realization of the full potential. The resulting probable savings in different operations predicted in 1981 for 1985 and 2000 are as follows:

	PROBABLE ACHIEVABLE SAVING	
FARM OPERATION	1985	2000
Crop Production	10%	35%
Annual Housing		
Dairy (electricity)	8%	15%
Hog (heating fuels)	12%	45%
(electricity)	8%	33%
Poultry (heating fuels)	9%	29%
(electricity)	5%	15%
Grain Drying	10%	35%
Transportation	20%	50%
Greenhouses	35%	50%

5.0 CLIMATE OF HURON COUNTY

5.1 Temperature

Average January and July maximum and minimum temperatures are given to show the range found across the county. Two good integrations of temperature data for energy planning are Heating Degree Days (18C-Daily Mean Temp summed up over the year) and Cooling Degree Days (Daily Mean Temp - 18C summed for the year). These are given in Table 5.1 and plotted on two county maps (figures 5.1 and 5.2 respectively). The winter Heating Degree Day map shows a strong southwest-to-northeast gradient in the south, and west-to-east gradient in the north. Heating demand will thus be least in the extreme southwest, increasing to a maximum at the county border near Listowel. The summer Cooling Degree Day pattern shows a lakeshore influence that moves the maximum cooling demand slightly east of the shoreline, then cooling demand decreases westward. Maximum cooling demand is in the south near Centralia.

5.2 Snow

Total snow for the winter (cm) is also listed in Table 5.1 and mapped in figure 5.3. There is a serious lack of data along the western edge of the county both north and south of Goderich, so the patterns drawn on the map are educated speculation that slightly less snow will fall near the shoreline than further inland. Based on the data from Brucefield, there is a mid-county split in the snowfall pattern, leaving a major maximum near Lucknow and a lessor maximum near Centralia. From mid-county eastward, snowfall amounts decrease more uniformly.

5.3 Wind

Wind data are very scarce, with only Goderich and Mount Forest (northeast of the county) being available. These sites give some grand-scale indication of differences between lakeshore and inland sites, with some additional influence of elevation included in the Mount Forest data. Table 5.2 shows that average values of speed and direction are rather similar at the two sites, having speed maxima in January and minima in the spring. Average mean wind directions are from south-southwest to west. Average annual speeds of 3.6 and 4.2 km/h are quite similar (differ by less than 1/2 mph). The seasonal wind direction frequencies (Table 5.3) do show some major seasonal shifts between the two stations. Goderich shows a major increase in south-sector winds (SE to SW) in summer, accompanied by a decrease in west-sector (SW to NW) summer winds. This trend is only weakly exhibited in the Mount Forest data where there is much less adjustment in the frequency of winds from the four sectors between summer and winter. The marked seasonal change in pattern at Goderich is expected to be associated with proximity to the lake but without further inland data between the two available stations it is not possible to say whether the shift in wind behavious occurs quite suddenly at some inland point or gradually eastward across the county.

5.4 Sunshine

Sunshine data is also very scanty (Table 5.4). Only Fullarton in the southeast and Mount Forest in the northeast record this variable, and no data are available from further west in the county. Only generalizations can be made from such poor coverage. Mount Forest has more hours of bright sunshine through most of the year, with totals nearly equivalent at the two stations only in May, June and July. This trend probably reflects a gradual increase in sunshine hours moving eastward from the lakeshore during much of the year, but further observations would certainly be required to effectively plan solar energy use. There may be a strip with higher sunshine hours near the lakeshore during the non-heating season.

TABLE 5.1:

STATION	JAN. TEMP. (°C)		JULY TEMP. (°C)		TOTAL SNOW (cm)	HEATING D.D. (<18C)	EXTREME COOLING D.D. (>24C)	COOLING D.D. (>18C)
	MAX.	MIN.	MAX.	MIN.				
Centralia	-2.7	-9.2	26.4	15.1	294	4041	21	285
Fullarton	-4.1	-11.2	25.4	13.6	187	4410	10	191
Cromarty	-4.4	-11.5	25.5	12.2	265	4534	5	182
Mitchell	-4.1	-12.1	25.6	12.5	190	4519	4	175
Brucefield	-2.7	-10.4	26.2	13.6	230	4168	9	217
Goderich	-2.6	-8.3	24.2	15.1	277	4002	7	199
Blyth	-4.3	-11.5	25.8	13.5	282	4438	8	215
Lucknow	-2.6	-10.3	25.7	13.6	349	4225	10	209
Listowel	-5.7	-12.7	24.0	12.1	194	4811	2	114
Wroxeter	--	--	--	--	228	--	--	--
Mt. Forest	-4.4	-12.5	24.5	12.0	277	4694	4	126
Clifford	--	--	--	--	221	--	--	--

TABLE 5.2: WIND (Mean speed and direction)

STATION	J	F	M	A	M	J	J	A	S	O	N	D	Year	
GODERICH	7.8	3.4	2.7	1.0	1.1	3.6	3.2	2.8	2.5	3.6	7.4	5.7	3.6	Avg. speed (km/h)
	W	WSW	SSW	W	SSW	SSW	WSW	SW	WSW	SW	WSW	WSW	WSW	Direction
	59	53	51	65	47	43	34	39	46	48	64	66		Max. hour speed
	SVL*	WSW	SVL	W	SSW	N	N	NW	NW	SVL	WSW	W		Direction
MT. FOREST	7.6	5.3	2.4	2.4	2.9	3.8	4.7	4.2	3.4	5.2	5.5	4.7	4.2	Avg. speed (km/h)
	WSW	W	WSW	W	WSW	WSW	W	WSW	SW	SW	WSW	SW	WSW	Direction
	66	68	68	67	63	48	48	48	56	63	72	60		Max. hour speed
	E**	WSW	E	W	WSW	WSW	NW	WNW	W	W	SSW	W		Direction

---

*SVL - SEVERAL DIRECTIONS

** - May be affected by nearby urbanization

TABLE 5.3: WIND FREQUENCIES (%) BY SECTORS AND SEASONS

STATION	NW to NE	NE to SE	SE to SW	SW to NW	CALM
GODERICH					
Summer	29.4%	23.1	41.4	23.3	5.9*
Winter	25.4	23.8	34.7	34.4	2.3
MT. FOREST					
Summer	19.2%	17.4	34.5	34.9	13.7
Winter	21.4	20.2	33.2	39.1	7.1

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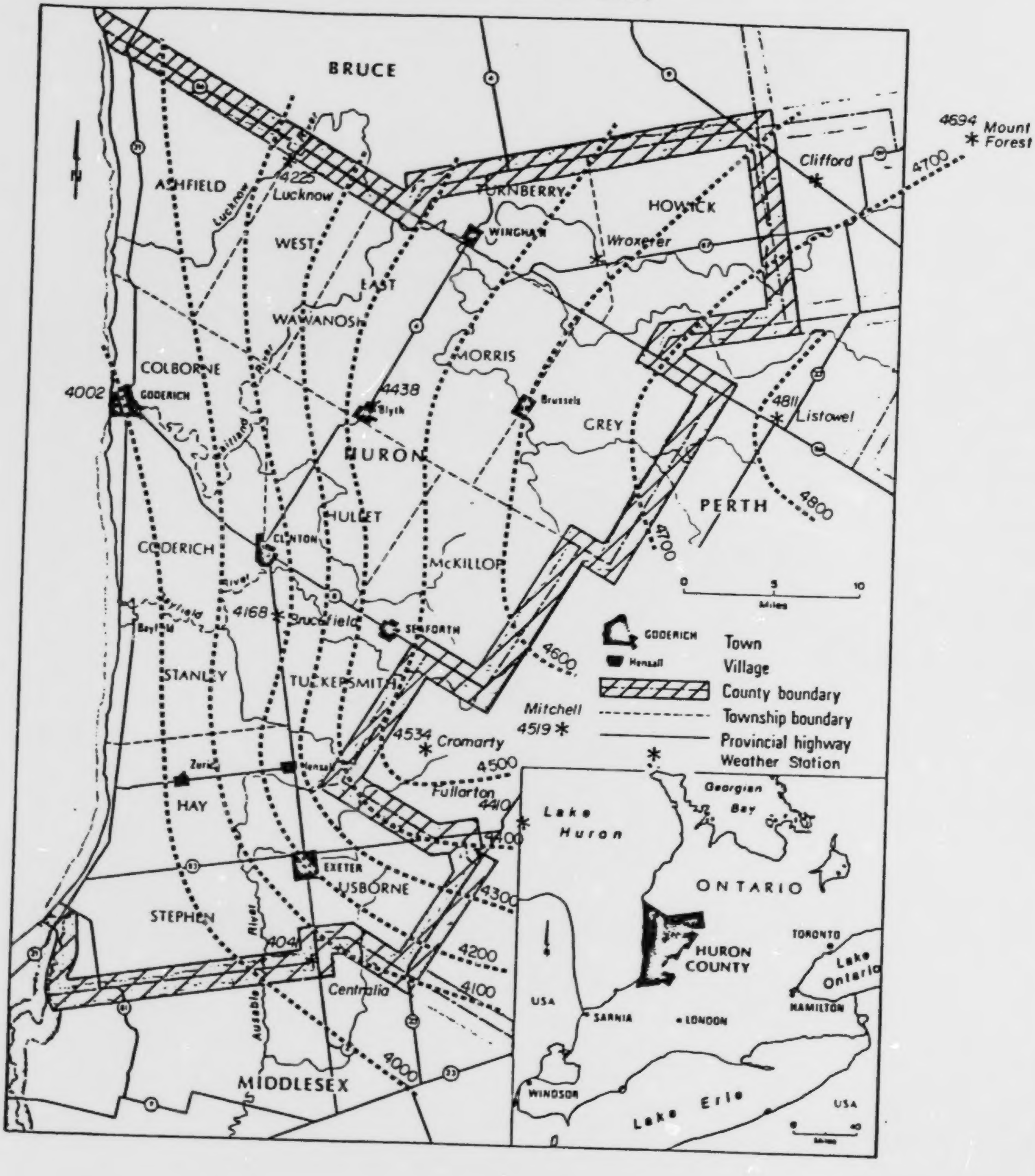
*Totals > 100% due to overlapping catagories

TABLE 5.4: HOURS OF BRIGHT SUNSHINE

STATION	J	F	M	A	M	J	J	A	S	O	N	D	Year
FULLARTON	46	88	118	146	242	257	286	228	162	120	54	37	1785
MT. FOREST	69	107	135	186	242	262	289	252	167	139	59	55	1961

FIGURE 5.1: HEATING DEGREE DAYS

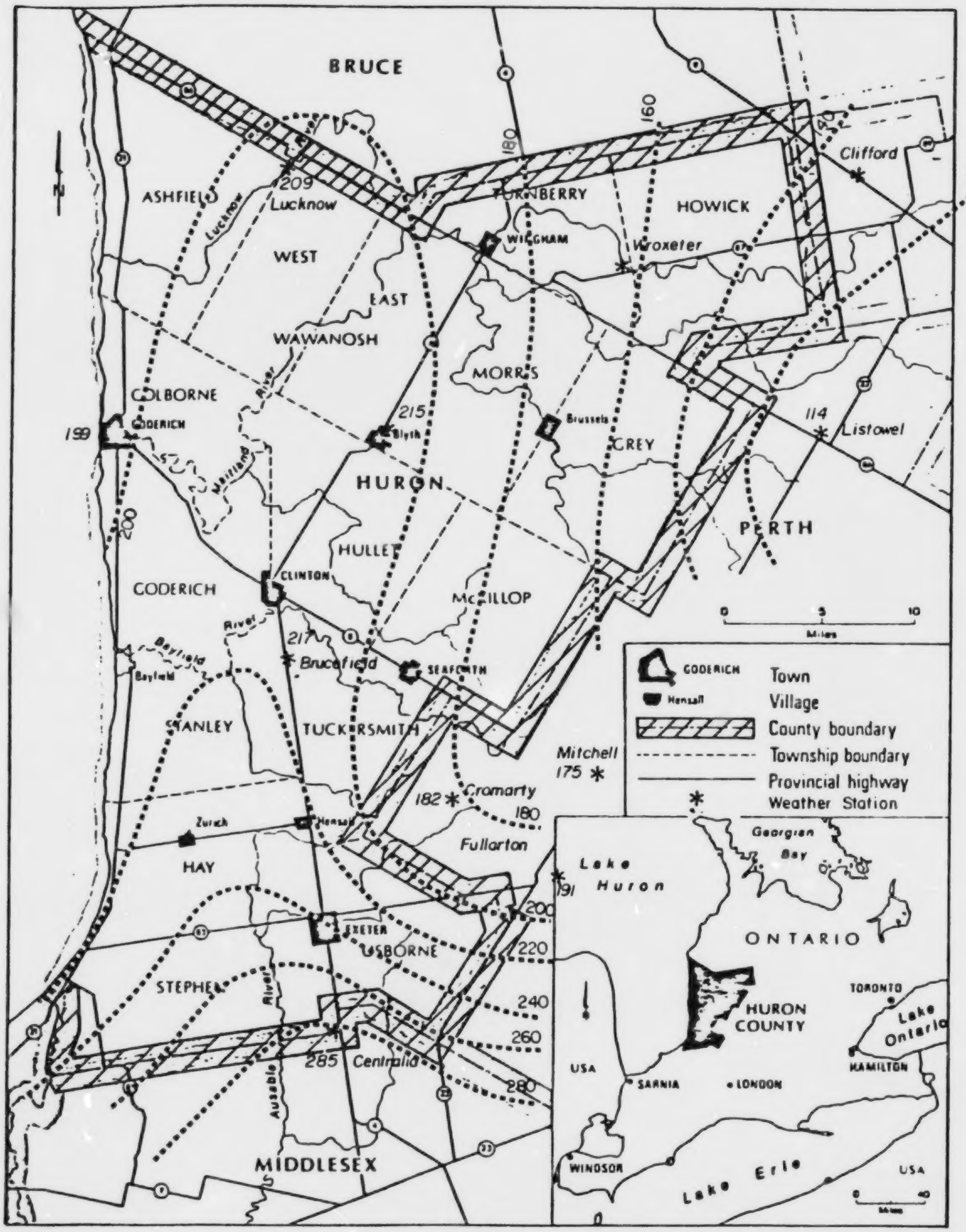

BRUCE
4694 Mount
* Forest
Clifford
4700
ASHFIELD
4225
Lucknow
TURNBERRY
HOWICK
WINGHAM
Wroxeter
WEST
EAST
WAWANOSH
MORRIS
COLBORNE
4002
GODERICH
4438
Blyth
Brussels
GREY
4811
Listowel
HURON
PERTH
4800
HULLETT
4700
GODERICH
CLINTON
McKILLOP
0
5
10
Miles
4168
Brucefield
SEAFORTH
Bayfield
GODERICH
Town
Hensall
Village
County boundary
Township boundary
Provincial highway
Weather Station
4600
STANLEY
TUCKERSMITH
Mitchell
4519
4534
Cromarty
4500
Zurich
Hensall
Fullarton
HAY
4410
4400
Lake
Huron
Georgian
Bay
EXETER
USBORNE
4300
ONTARIO
STEPHEN
4041
4200
HURON
COUNTY
TORONTO
Lake
Ontario
Centralia
4100
USA
SARNIA
LONDON
HAMILTON
Ausable River
4000
MIDDLESEX
WINDSOR
Lake Erie
USA

4041 HEATING DEGREE DAY

* WEATHER STATION

•••••••••••• HEATING DEGREE DAY ISOPLETH

FIGURE 5.2: COOLING DEGREE DAYS

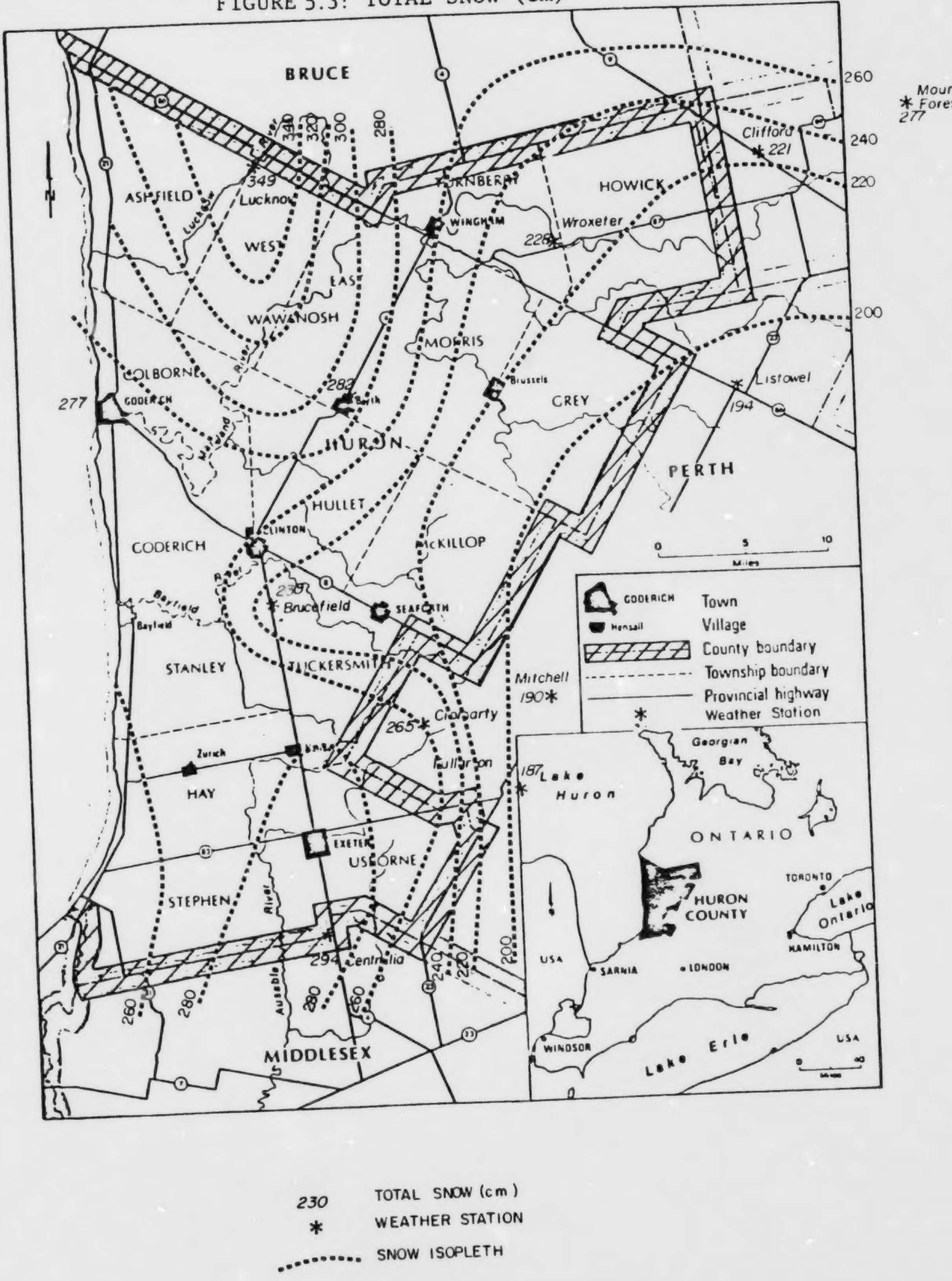

BRUCE
ASHFIELD
Lucknow
209
WEST
EAST
WAWANOSH
TURNBERRY
HOWICK
WINGHAM
Wroxeter
Clifford
125
120
140
160
180
MORRIS
COLBORNE
GODERICH
199
200
215
Blyth
Brussels
GREY
114
Listowel
HURON
PERTH
HULLET
CLINTON
GODERICH
McKILLOP
217
Brucefield
SEAFORTH
Bayfield
STANLEY
TUCKERSMITH
Mitchell
175
182
Cromarty
180
Fullarton
Zurich
Hensall
HAY
191
200
EXETER
USBORNE
220
STEPHEN
240
260
285
Centralia
280
MIDDLESEX
Lucknow
Maitland River
Bayfield River
Ausable River
0
5
10
Miles
GODERICH
Town
Hensall
Village
County boundary
Township boundary
Provincial highway
Weather Station
Georgian Bay
Lake Huron
ONTARIO
TORONTO
Lake Ontario
HURON COUNTY
HAMILTON
USA
SARNIA
LONDON
WINDSOR
Lake Erie
USA
0
40
Miles

182 COOLING DEGREE DAYS

* WEATHER STATION

•••••••••••• COOLING DEGREE DAYS ISOPLETH

FIGURE 5.3: TOTAL SNOW (cm)


BRUCE
HURON
PERTH
MIDDLESEX
ASHFIELD
WEST
EAST
WAWANOSH
TURNBERRY
HOWICK
MORRIS
GREY
COLBORNE
HULLET
McKILLOP
GODERICH
STANLEY
TUCKERSMITH
HAY
USBORNE
STEPHEN
Fullarton
Lucknow
Wingham
Wroxeter
Brussels
Blyth
Goderich
Clinton
Seaforth
Bayfield
Zurich
Hensall
Exeter
Brucefield
Mitchell
Clinton
Centralia
Listowel
Clifford
Mount Forest
349
228
282
277
230
265
190
187
294
194
221
277
340
320
300
280
260
240
220
200
Lucknow River
Maitland River
Bayfield River
Ausable River
N
0 5 10
Miles
Town
Village
County boundary
Township boundary
Provincial highway
Weather Station
Georgian Bay
Lake Huron
ONTARIO
HURON COUNTY
TORONTO
Lake Ontario
HAMILTON
USA
SARNIA
LONDON
WINDSOR
Lake Erie
USA
230 TOTAL SNOW (cm)
* WEATHER STATION
SNOW ISOPLETH

6.0 SETTLEMENT PATTERNS IN HURON COUNTY

6.1 General Description

Huron County is located in western Ontario on the east shore of Lake Huron. It is approximately 100 miles west of Toronto and Hamilton, 40 miles northwest of London and 40 miles northeast of Sarnia. Provincial Highways 4, 8 and 86 are the major connections from Huron County to the Highway 401 axis.

Huron County supports a population of approximately 56,000 people who are distributed over the rural and urban landscape in 26 municipalities. Goderich is the major urban centre of the five incorporated towns within the County, offering important port and airport facilities. Other towns in the area include Exeter, Clinton, Wingham and Seaforth. Five villages and numerous settlements are also scattered across the countryside. It is however this countryside, with nationally significant quality farmland which is the influential factor in the character of the county.

Approximately 88% of Huron County's total land area is used in active farmland. This is due to the very high quality soils and good climatic conditions which support a high percentage of improved agricultural land.

In addition to soils, the general physiography of the County (the basic determinant of land use capability) is conducive to farming. Four major regions can be identified in Huron County.

1. Along Lake Huron in a strip with a depth inland of approximately 2 miles is the Huron Shore Plain, which characteristics are similar to that of an old lake bed: poorly drained soils, large amounts of clay deposits, low phosphorus, medium natural fertility and susceptibility to gully erosion. Known gas and oil deposits are located in this region. This strip also is bisected by a number of river valleys flowing from the east into Lake Huron.
2. From a few miles inland to the centre of the County, in a wedge running the length of the County, is a moraine ridge identified by a number of moraines and glacial spillways. This area has a high concentration of sand and gravel deposits, a number of swamps and slopes steeply to the west.
3. In the northeastern portion of Huron County there is a drumlinized till plain characterized by drumlins and a well drained topography.
4. A flat till plain is located in the southeastern portion with a solid clay loam base.

6.2 Agricultural Characterization

Huron County has an area of approximately 340,264 hectares and a population of 56,127 persons. Of this, approximately 296,804 hectares are occupied by 3790 farms with a rural population of 36,019 persons.

The majority of the rural land in Huron County is used for field crop production. 12,420 hectares of land are in wheat production (12,087 hectares of which are winter wheat) and 2065, 19740, 25309 and 23 hectares are in production of oats for grain, barley, mixed grains and fall rye respectively. 80,831 hectares of grain corn and 4,430 hectares of soybeans are grown. Field beans are grown on 22,184 hectares while field peas and potatoes are grown on only 165 and 155 hectares respectively.

A significant amount of the land area is used for the production of crops other than field crops. Corn for silage is grown on 19,603 hectares and hay is grown on 33,337 hectares. Specialty crops such as tree fruits, small fruits and vegetables are gown on 177, 47 and 1771 hectares respectively.

Livestock production is also important in Huron County. Within the County, there are 190,497 head of cattle of which 24,671 are cows used for milk production. There are also a total of 343,314 pigs in the County and almost 3 million hens and chickens.

Agriculturally, Huron County can be divided into three areas:

1. The mixed livestock farming areas in the northwest townships
2. The specialty and fruit crop areas in the west central part of the County, centering around Goderich Township
3. The vegetable and cash crop producing townships in the southern part of Huron County and along the lakeshore.

Livestock farming occurs in every township in Huron County. However, as shown in Table 6.1, the northeastern part of the County has a higher concentration of cattle, dairy and pork producers along with a higher proportion of land allocated to pasture and hay production. There is also a higher concentration of poultry operators in the northeast, but the County distribution is not as clear cut. There are proportionately a large number of poultry producers also in Hay, Goderich and Hullett Townships. The mixed farming operations tend to concentrate on the well and imperfectly drained loamy soils in the northeast.

The fruit tree and small fruit crop areas tend to be concentrated in and around Goderich Township. This could possibly be due to the high concentration of sandy soils near Lake Huron between the towns of Goderich and Bayfield. The sandy soils are usually easier to manage and the proximity of the lake tends to moderate the climate. These factors are increasingly important when dealing with high value fruit crops. There is also a concentration of greenhouses (approximately 25% of the County total) in Goderich Township.

The vegetables are grown mainly in the southern part of the County. Usborne, Stephen and Hay Townships have 55%, 21% and 9% respectively of the total land area used for vegetable production (Table 6.3). Most of the field beans, soybeans and grain corn are grown in southern Huron County (Table 6.2) along with the associated increased use of large tractors and self propelled combines. Ashfield Township, in northwestern Huron is similar in some ways to southern Huron County in the proportion of operators using self propelled combines and large tractors and the associated production of cash crops (corn and soybeans).

The major agricultural divisions in Huron County, as with most other counties in Ontario, occur on the basis of soils and climate and possibly the proximity to markets. Eighty-nine percent of the County's land resource base has Classes 1 and 2 capability for agriculture. Eighty-eight percent of the County is in active farmland (improved and unimproved). A substantial portion of the County's gross income is derived from agricultural activities. Historically, the County has been an agricultural area for over one hundred years.

A further energy consideration in dealing with agriculture in Huron County is the availability and proximity of agricultural industries and businesses servicing the production areas. Below is a listing of agricultural industries established in Huron County, (as derived from County of Huron-Information).

LISTING OF ESTABLISHED AGRICULTURAL INDUSTRIES IN HURON COUNTY

	NAME	NO. EMPLOYED	PRODUCTS/ SERVICE
CLINTON	Cyanamil of Canada Ltd.	5	Farm supplies
	Fleming Feed Mill	18	Farm feed - elevators.
	Hummel's Feed Mill	3	Farm feed
EXETER	Big-O-Drain Tile Co.	41	Corrugated plastic drainage tile
	Canadian Canners Ltd. (Aylmer-Delmonte Prod.)	38	Vegetable processing
	Exeter District Co-op	16	Farm feed and fert. and lumber
	Exeter Produce & Storage Co.	45	Processed rutabaggas
	Huron Produce	10	Turnip processing
	Huron Tractor	30	John Deere Farm Equipment
	Kongskilde Ltd.	40	Farm Tillage Equipment
	Syfilco	3	Knitted filters for farm drainage
GODERICH	Goderich Elevator & Transit Co.	40	Grain storage and transit
SEAFORTH	Seaforth Creamery	20	Dairy Products
	Topnotch Feeds Ltd.	38	Livestock feeds
WINGHAM	T.B. Allen Ltd/Wingham Feed Mill	1	Warehouse and farm supplies

BLYTH	Howson Mills	30 - 35	Farm feeds and semalina
	Snell Feeds & Supplies	10	Farm Supplier/ livestock feed
	Wallace Turkey Products	6	Turkey products
HENSALL	Cook's (A Div. of Gerbro. Corp.)	20 - 25	Elevators
	Hensall District Co-op	50	Farm supplier
	Thompson & Son Ltd.	40	Elevators
ZURICH	McKinley Farm & Hatchery	18	Hatchery, baby chicks, pullets
BLUEVALE	United Co-op of Ontario	10	Feed, fert., farm supplies
GORRIE	Farmatic	50	On-the-farm feed

Source: Huron County Department of Planning and Development, "County of Huron - Information".

A study of agribusiness in Huron County was conducted by Penfold (1979)[1], in order to assess the locational attributes of rural industry and commerce and the perceived locational needs of the agribusiness sector. In that study it was identified that there was a strong attraction by agriculture related rural businesses to paved roads in the rural and fringe areas. Agricultural services and processing (output) and retail and service commercial outlets seemed to be most attracted to provincial roads whereas agricultural services (input) and general rural commercial were more often located on county roads. Some of the larger, energy-consuming processing outlets were also attracted to the network of available three phase power lines. Unavoidably most rural businesses were located on agricultural capability Class 1 to 3 soils, (94% of rural uses inventoried and 94% of fringe uses).

Advantages identified for rural locations included a lack of traffic conflict with machinery movements, good location in the market area, and a lack of conflict with adjacent landowners. Most machinery dealer respondents to a survey conducted by Penfold indicated that an industrial or commercial park location close to an urban settlement would have been considered as an alternate site provided that development in such a location was economically feasible, and areas of land in the range of 5 to 10 acres were available. These businesses indicated a market area of between 25 and 40 miles.

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[1] Penfold, G.E. "Locational and Site Characteristics of Rural Business and Industrial Facilities, and The Implications of Rural Planning Policy for the Agribusiness Sector - Huron County Case Study", University of Guelph, December 1979.

The grain drying and storage business, (4 in Huron) are most interested in paved road access and availability of three phase power. Market areas ranged from 20 to 50 miles. As with other general rural commercial businesses surveyed, the grain drying and storage companies indicated they would not have considered locating in an industrial-commercial park due generally to prior land ownership factors or the association of the businesses with owner residences.

In line with Energy Conservation Planning Measures

B3 - Higher Intensity of Commercial and Industrial Development; and

B4 - Concentrate Commercial Development in Nodes and Corridors,

therefore, it may be desirable, from an energy viewpoint but not acceptable to consider agribusiness parks in Huron County. One obvious constraint, in view of the limited growth being experienced in the County, is the potential conflict with Provincial Food Land Policies inherent in the redesignation of large tracts of land for use in agribusiness park development.

TABLE 6.1

ZONE	LIVESTOCK - % OF FARMS IN ZONE REPORTING (Number of Livestock)				FARM MACHINERY - % of Farm in Zone Reporting		
	Total Cattle	Dairy Cows	Pigs	Hens & Chickens	Total Tractors	Tractors 150+hp PTO	Self Propelled Combines
Huron	59 (190497)	20 (24671)	39 (343314)	25 (2911875)	88	6.0	27.9
Usborne	51 (14167)	11 (1043)	33 (19463)	18 (105415)	88	7.3	33.9
Stephen	57 (15448)	11 (850)	34 (21255)	20 (7351)	89	9.7	28.2
Hay	37 (3982)	9 (410)	26 (16810)	28 (174087)	90	6.0	42.9
Tuckersmith	41 (9106)	14 (1001)	39 (28499)	20 (292605)	85	9.5	34.8
Stanley	48 (8262)	12 (703)	30 (17018)	23 (314431)	89	10.6	40.4
Goderich	47 (6434)	17 (1475)	27 (20486)	26 (383152)	86	4.5	20.9
Colborne	57 (6929)	18 (1014)	31 (9478)	19 (145776)	91	5.6	19.4
Hullett	52 (12314)	21 (2122)	37 (27381)	37 (697707)	87	5.2	24.8
McKillop	52 (10552)	19 (1717)	47 (28380)	15 (106759)	93	8.0	31.9
Grey	69 (16313)	30 (3707)	40 (28442)	23 (251737)	89	4.5	24.7
Howick	76 (25509)	36 (3370)	51 (34790)	30 (59797)	94	2.8	27.7
Turnberry	73 (9148)	26 (1320)	41 (11544)	25 (93643)	98	3.1	17.5
Morris	70 (15418)	22 (1574)	46 (29116)	26 (74039)	89	2.9	25.8
East Wawanosh	75 (11978)	28 (1679)	36 (11304)	32 (6619)	91	5.7	19.0
West Wawanosh	73 (10705)	26 (1116)	48 (10473)	34 (43230)	81	2.6	17.4
Ashfield	63 (14232)	19 (1570)	42 (28275)	21 (155301)	84	3.8	29.4

(after Census Canada, 1981)

TABLE 6.2:

ZONE	TOTAL AGRICULTURAL LAND AREA (ha)	LAND USE - % OF ZONE AREA				CROPS - % OF ZONE AREA					
		IMPROVED LAND (TOTAL)	UNDER CROPS	UNDER PASTURE	UNIMPROVED LAND(TOTAL)	SMALL GRAINS	FIELD BEANS	SOYBEANS	GRAIN CORN	SILAGE CORN	HAY
Huron	296804	86	76	8	14	21	7	1.5	27	7	11
Usborne	18882	92	86	4	8	19	12	2.8	28	10	8
Stephen	19813	93	85	5	7	19	16	2.5	29	10	7
Hay	16979	91	84	4	9	21	13	4.0	36	2	6
Tuckersmith	16480	91	85	4	9	21	13	1.9	38	5	6
Stanley	18541	89	84	3	11	21	16	3.3	35	4	5
Goderich	17484	83	72	7	17	20	6	1.1	28	4	11
Colborne	11060	86	75	8	14	22	5	0.4	28	6	13
Hullett	19366	88	78	7	12	19	5	2.5	33	5	12
McKillop	22344	93	84	6	7	21	15	0.8	34	4	8
Grey	24428	85	73	10	15	20	5	0.4	24	6	16
Howick	25512	80	67	10	20	23	1	0.1	12	13	17
Turnberry	11776	74	59	13	26	18	1	0.6	15	8	15
Morris	19822	81	66	13	19	19	4	0.8	21	6	14
East Wawanosh	14835	78	65	10	22	16	3	0.4	21	8	16
West Wawanosh	14710	78	59	16	22	19	1	0.1	17	7	15
Ashfield	24774	91	79	8	9	22	2	1.5	34	6	11

(after Census Canada, 1981)

TABLE 6.3 SPECIALTY CROPS - % OF ZONE AREA (% of County Production Area) GREENHOUSES - SQ. METRES

ZONE	Total Fruit Trees		Total Small Fruits		Total Vegetables		
Huron	0.060	(100.0)	0.016	(100.0)	0.60	(100.0)	5749
Usborne	0.039	(4.1)	0.002	(0.9)	5.15	(54.9)	0
Stephen	0		0		1.90	(21.2)	N.A.
Hay	0.020	(1.9)	0.031	(11.3)	0.89	(8.5)	N.A.
Tuckersmith	0.017	(1.6)	0.043	(15.2)	0.28	(2.6)	0
Stanley	0.104	(10.9)	0.025	(10.9)	0.27	(2.8)	N.A.
Goderich	0.507	(55.9)	0.024	(9.0)	0.22	(2.1)	1636
Colborne	0.052	(3.2)	0.034	(8.1)	0.02	(0.1)	N.A.
Hullett	0.004	(0.4)	0		0.52	(5.6)	N.A.
McKillop	0		0		0.02	(0.2)	N.A.
Grey	0.040	(5.5)	0.069	(35.9)	0.04	(0.5)	0
Howick	0.006	(0.9)	0.001	(0.4)	0.01	(0.2)	0
Turnberry	0		0.005	(1.3)	0.02	(0.1)	N.A.
Morris	0.110	(12.3)	0.003	(1.3)	0.06	(0.7)	N.A.
East Wawanosh	0.011	(0.9)	0		0.02	(0.2)	0
West Wawanosh	0.005	(0.5)	0.001	(0.4)	0.01	(0.1)	0
Ashfield	0.013	(1.9)	0.010	(5.6)	0.01	(0.1)	0

(after Census Canada, 1981)

6.3 The Townships in Huron County

Stephen Township has the largest population of the sixteen townships with approximately 4100 people distributed in Huron Park, seven hamlets and the surrounding rural area. The growth capacity of the "urban" areas of the Township is good, provided it is on an infill basis. The only area constrained for growth is Centralia which has limited water supply. The Township, like most of Huron County, has an ample supply of high quality agricultural land, with 92% of the land rated Class 1 and 2 for agricultural suitability. Stephen Township also has several major forestry areas (owned by the Conservation Authority) centred around the shoreline and remaining woodlots comprise 11% of the land use. The area borders the Ausable River and Grand Bend recreation areas and as such, it has a high recreational rating. Along the shoreline, especially in the Grand Bend area, intensive cottage and permanent residential development has taken place. Additionally in the Ausable River area there is the Klondyke Special Study Area, a floodplain with high agricultural capabilities and a flooding hazard. The extraction of oil in the southwest portion of Stephen Township has almost exhausted it's limited supply and gas near Dashwood is known to exist.

Usborne Township, a largely rural area, has a population of approximately 1600 people distributed over its countryside and, to a small extent, located in the four hamlets within it's boundries. These hamlets are equipped to take only minimal growth through infilling due to constraints on well water supply. The township has a very highly rated capability for agriculture with 95% of the total land area classified as Class 1 and the remaining 5% Class 2. The topography of the area is rolling to hilly and is bisected by three rivers. Although much clearing has taken place due to the development of farmland, approximately 3,000 acres of forest and bush still exist on land rated Class 1 for forest capability. The extent of woodlot and forest clearing, however, has taken place on such a vast scale that an erosion problem has developed. This reduction in the amount of intact natural areas, combined with the absence of large expanses of water (excluding 90 acres in Morrison Dam Conservation Area), has influenced recreational uses of the land, with no cottage or trailer development in the township. Additionally, there has been some extraction of sand and gravel in deposits along the eastern portion of the township near Kirkton. There are other pockets of sand and gravel through the centre of the township.

Tuckersmith Township is an agricultural area, with a population of approximately 3,000 people distributed in farms or in the hamlets on the peripheral provincial highways. The township has a high agricultural capability with 75% of the land rated Class 1. The topography of the township is conducive to farming as it is rolling to hilly, with the exception of the area along Provincial Highway 4 and in the northwest where the hilliness, poorer drainage and erosion problems limits agricultural capability. The township has little forested land remaining partially due to clearing for agricultural purposes and primarily because restricted root depth and soil moisture problems have resulted in a low timber capability. The feasibility of sand and gravel extraction is negligable and there are no operations existing in the township.

Hay Township has a population of just under 2000 people. Agricultural conditions are favourable with 81% of the total land area rated Class 1, 2 and 3 for agricultural suitability and although a remaining 18% of the land is considered organic, most has been actively utilized for vegetable production. The natural environment has, to a limited extent, been protected along the Ausable River vegetation corridor, Black Creek, segments of the lakeshore and wet land and scattered forested areas. A high quantity and quality of sand and gravel deposits exist and limited extractive operations have occured in the area. Small quantities of natural gas have been discovered around Dashwood and Zurich. A large forest owned by the Conservation Authority is located north-west of Exeter.

Stanley Township has a population of approximately 1600 people. Approximately 97% of the total land area is rated Class 1, 2 or 3 for agriculture with 3% of the land area consisting of organic used for vegetable production. Again, remaining "natural" areas are found along the Bayfield and other rivers, portions of the lakeshore and intermittant marshes, woodlots and forested areas. Stanley Township also has a limited quantity of good sand and gravel deposits which are undergoing limited extraction in addition to small natural gas production around Bayfield.

Hullett Township, with a population of approximately 1950 people, has experienced a relatively stable settlement pattern. With hamlets within its boundaries, the needs of the rural community are being served through the provision of commercial and social services and their function as retirement centres for community farmers. The only future constraint on development is the existing level of services offered in the urban centres, as wells are being utilized and a communal sewage system is not envisioned. The agricultural resource base of Hullett shows a large concentration of high capability soils, with 92% of the soils rated Class 1, 2 or 3. The topography of the area is rolling to hilly in the west and only slightly rolling in the east except where the South Maitland River has leveled wetland regions of a Wildlife Management Area. This wetland area has been designed as a waterfront habitat through dyking systems and covers 2,400 hectares of land northeast of the Town of Clinton. The natural vegetation here as well as throughout the Township, has been recognized for its agricultural and wildlife benefits and is being protected. Extractive industries are presently utilizing resources of sand and gravel scattered across the Township.

Goderich and Colborne Townships jointly have a population of 4300 people distributed across the area with concentrations at Holmesville, Benmiller, the area surrounding Goderich and including Saltford, and with a seasonal intensity along the lakeshore. In keeping with the nature of soils and physiography of Huron County, 98% of the total land area is classified Class 1 and 2 for agricultural suitability, a result of slightly rolling topography and recharge areas along the Maitland and Bayfield Rivers. The area is unique in the County due to the existance of high quality salt deposits in the Goderich/Saltford lakeshore area. Forested areas are scattered across both Townships with vegetation corridors along the rivers. Extensive sand and gravel deposits and licenced pits are located within the Maitland River valley and on the moraine.

Ashfield Township has approximately 1800 people distributed over the township and concentrated in the Villages of Port Albert and Dungannon and a number of hamlets. Unlike most townships with Lake Huron as a boundary, Ashfield still has a relatively large amount of undeveloped shoreline. Similar to the other lakeshore townships, however, erosion problems exist along the lake. Soil and physiographic conditions are excellent with 99% of the total land area considered Class 1, 2 and 3 farmland. The area also has a limited number of sand and gravel deposits, some of which are being utilized. A number of rivers bisect Ashfield resulting in vegetation corridors and marshes along them. The Nine Mile River is to be specially protected as it is a viable trout spawning river. Forest cover is very limited throughout the Township.

East and West Wawanosh Townships have a population of 2500 people with small settlements around their periphery. Approximately 70% of the total land area is Class 1, 2 and 3 capability for agriculture, however a number of organic areas exist in these townships created by the soil type and the influence of the Maitland and other rivers. A relatively large portion of the townships have forest cover and a number of sand and gravel pits are operating particularly in the deposits along the Maitland River Valley.

Morris Township has a population of approximately 1600 people with a number of towns and hamlets around it's boundries. Over 76% of it's total land area is rated Class 1, 2 and 3 for agricultural capability. The township's base is limestone till plain and has a rolling to hilly topography with the exception of the area around the Little/Middle Maitland River which is somewhat flat and exposed. This area also has good vegetation cover, the township as a whole having 16% covered by forest/woodlot and the land is ideal for commercial forests (firewood, etc.). The Township has good drainage with the exceptions being north of Blyth and around Walton. There are also distinct erosion problems in the central and northwest portions of the township. There is limited sand and gravel resource.

Grey Township has a population slightly under 2000 people with only a few hamlets within it's boundries. The area is very highly rated for agriculture with 90% of the total land area Class 1 and 2 and it's soil is mainly till except in the northeast and southwest. The area has a rolling topography and is highly suited forestry, however much has been cleared for farming and cover is sparse except for vegetation corridors along the river (Little/Middle Maitland). The township naturally has drainage problems in the south and southwest, however, this has been overcome by the introduction of extensive artificial drainage systems. Sand and gravel resources are concentrated near the southeast and the north.

Turnberry and Howick Townships together have a population of almost 4600 people distributed over the countryside and in settlements. Approximately 75% of the land is rated as Class 1, 2 and 3 capability for agriculture, however, half of the remaining portion is considered too stoney and too steep and the other half has poor drainage and has been left for wet forests and marshes. The area is steep to rolling and has a number of moraines, eskers and drumlin fields. Both Townships have a number of rivers, streams, creeks and resulting marshes which are also areas of good forest cover. Sand and gravel resources are extensive in the Maitland River Valley in Turnberry and in the Lakelet area in Howick.

6.4 The Settlements in Huron County

Seven typical forms of settlement have been identified in Huron County and are described as follows. A settlement may include all or part of a municipality and may also lie within more than one township.

TYPE 1: Urban Settlement with a broad range of service establishments and institutional use and full municipal services.

TYPE 2: Urban Settlement with a narrow range of economic activities, limited service establishments and institutional uses with full or partial municipal services.

TYPE 3: Settlement which is predominantly residential and has very limited service establishments and may contain institutional uses. Other settlements may consist of residential only. No municipal water and sewer services exist in any of these settlements.

These settlements are subdivided into:

(A) Settlements with 50 or more dwelling units.

(B) Settlements with less than 50 dwelling units.

TYPE 4: Isolated non-farm residential units distributed throughout the County including permanently-occupied units along the Lake Huron shoreline and the Grand Cove area north of Grand Bend.

TYPE 5: A farmstead.

TYPE 6: Seasonal settlements consisting of cottages and commercial recreation. These are located along the Lake Huron shoreline, in Bayfield and throughout the County.

DISTRIBUTION OF SETTLEMENTS TYPES (1982)

Type	Total number of Dwelling Units		Total Population	
1	8,320	42%	20,050	36%
2	1,640	8%	4,540	8%
3(A)	2,030		5,860	
(B)	830		2,540	
	2,860	15%	8,400	15%
4	2,400	12%	8,450	15%
Lakeshore	380		1,020	
Grand Cove	270		430	
Elsewhere	1,760		7,000	
5	4,490	23%	14,690	26%
Total	19,710	100%	56,130	100%
6	3,100 cottages			
Lakeshore	2,330			
Bayfield	240			
Elsewhere	530			

6.5 List of Settlement by Type in Huron County

TYPE 1

EXETER TOWN (includes fringe development)

- Urban Settlement: Population: 3,680; Units: 1580
- Broad range of commercial activity, industrial activity (Arc Industries, Exeter Produce & Storage, Big-O-Drain, Canadian Canners) and institutional uses (hospital, schools, nursing homes)
- Full municipal services (water pumped from wells, sewage oxydation ponds)
- Hwy 83 and Hwy 4

CLINTON TOWN (includes fringe development)

- Urban Settlement: Population: 2,930; Units: 1210
- Broad range of commercial activity, industrial activity (Lanis Construction, Draper Bros., Epps, Fleming Mill) and institutional uses (hospital, schools, nursing homes)
- Full municipal services (water pumped from wells, sewage mechanically treated)
- Hwy 8 and Hwy 4 and County Rds. 8 and 13

SEAFORTH TOWN (includes fringe development)

- Urban Settlement: Population: 2100; Units: 860
- Broad range of commercial activity, industrial activity (Genesco Shoes, Top Notch Feeds, Seaforth Creamery) and institutional uses (hospital, schools, nursing homes)

. Full municipal services (water pumped from wells, sewage lagoons)
. Hwy 8 and County Rd. 12

GODERICH TOWN (includes fringe development)

. Urban Settlement: Population: 7,740; Units: 3050
. Broad range of commercial activity, industrial activity (Champco, Domtar, Sheaffer-Eaton) and institutional uses (hospital, schools, nursing homes) plus port and airport
. Full municipal services (water piped from Lake Huron, sewage mechanically treated)
. Prov. Hwy 21 and 8 and County Rd. 31

WINGHAM TOWN (includes fringe development)

. Urban Settlement: Population: 3,030; Units: 1260
. Broad range of commercial activity, industrial activity (Western Foundry, C.K.N.X., Premium-Lloyd) and institutional uses (hospital, schools, nursing homes)
. Full municipal services (water pumped from wells, sewage treatment lagoons)
. Prov. Hwy 4 and 86, County Rd. 7

HURON PARK (Stephen Twp.)

. Urban Settlement: Population: 570; Units: 360
. Broad range of commercial activity, industrial activity (Dashwood Ind., Fleck Manuf., Trail Manuf.) and institutional uses (school, Huron Hope)
. Full services (private well water supply and sewage treatment)
. Prov. Hwy 4 and County Rd. 21

TYPE 2

HENSALL VILLAGE (includes fringe development)

- Urban Settlement: Population: 970; Units: 390
- Narrow range of economic activity (General Coach & Home Systems, Co-Op, Thompson), and institutional uses (school, nursing home)
- Full services (water pumped from wells, sewage oxydation pond)
- Prov. Hwy 4 and 84

ZURICH VILLAGE (includes fringe development)

- Urban Settlement: Population: 1,130; Units: 310
- Narrow range of economic activity (McKinley Farms, Zurich Wood, Haberer Concrete) and institutional uses (schools, nursing home)
- Full services (water pumped from wells, sewage lagoon)
- Prov. Hwy 84, County Rd. 2

VANESTRA (Tuckersmith Twp.)

- Urban Settlement: Population: 550; Units: 240
- Narrow range of economic activity (Bayfield Boats, Ontario Hydro, Gerrits Equipment) and institutional uses (Connestoga College, school)
- Full services (water pumped from wells, municipal sewage treatment)
- Prov. Hwy 4

BLYTH VILLAGE (includes fringe development)

- Urban Settlement: Population: 930; Units: 330
- Narrow range of economic activity (Radforth Construction, Howson Mills), institutional uses (schools) and recreational uses (theatre)
- Partial municipal services (water piped from wells, sewage treatment plant)
- Prov. Hwy 4, County Rd. 25

BRUSSELS VILLAGE (includes fringe development)

- Urban Settlement: Population: 960; Units: 370
- Narrow range of economic activity (Feed Mill & Fertilizer Plant, McDonald Lumber) and institutional uses (school, nursing home)
- Partial services (municipal water supply piped from wells, sewage by septic/tile)
- County Rd. 16 and 12

TYPE 3(A)

CENTRALIA (Stephen Twp.)

- Predominantly Residential - retirement centre for farmers - services source of farm supply and repair
- Private septic systems, water from private/communal wells

CREDITON (Stephen Twp.)

- Predominantly Residential - little commercial no industrial - administrative seat for township
- Private (individual) wells and septic/tile systems

- DASHWOOD (Stephen Twp. and Hay Twp.)

  - Predominantly Residential - little commercial and industrial
  - Water service but private septic tanks/tiles

EGMONDVILLE (Tuckersmith Twp.)

- Predominantly Residential - little commercial
- Private wells, private septic tank/tile, partially serviced municipal sewers

BAYFIELD VILLAGE

- Predominantly Residential - some commercial and industrial. Large component of seasonal cottages.
- Private and communal wells, private septic tank/tile

BENMILLER (Colborne Twp. and Goderich Twp.)

- Predominantly Residential, little commercial and industrial
- Private and communal wells, private septic tank/tile

PORT ALBERT (Ashfield Twp.)

- Predominantly Residential, some commercial
- Private and communal wells, private septic tank/tile

DUNGANNON (Ashfield Twp.)

- Predominantly Residential, little commercial
- Private and communal wells, private septic tank/tile

AUBURN (W. Wawanosh Twp., Colborne Twp. and Hullett Twp.)

- Predominantly Residential, little commercial
- Private and communal wells, private septic tank/tile

BELGRAVE (E. Wawanosh Twp. and Morris Twp.)

- Predominantly Residential, little commercial
- Private wells, private septic tank/tile

BLUEVALE (Morris Twp. and Turnberry Twp.)

- Predominantly Residential, little commercial
- Private and communal wells, private septic tank/tile

ETHEL (Grey Twp.)

- Predominantly Residential, little commercial
- Private and communal wells, private septic tank/tile

WROXETER (Howick Twp.)

- Predominantly Residential, little commercial
- Private and communal wells, private septic tank/tile

GORRIE (Howick Twp.)

- Predominantly Residential, little commercial
- Private and communal wells, private septic tank/tile

FORDWICH (Howick Twp.)

- Predominantly Residential, little commercial
- Private and communal wells, private septic tank/tile

TYPE 3(B)

MOUNT CARMEL (Stephen Twp.)

- Predominantly Residential - school - little commercial
- Individual wells and private septic/tile

SHIPKA (Stephen Twp.)

- Predominantly Residential - little commercial
- Private and communal wells, private septic tank/tiles

CORBETT (Stephen Twp.)

- Predominantly Residential - little commercial
- Private and communal wells, private septic tanks/ tile beds

GREENWAY (Stephen Twp.)

- Predominantly Residential - little commercial
- Private and communal wells, private septic tanks/ tile beds

ELIMVILLE (Usborne Twp.)

- Predominantly Residential - little commercial and institutional (Twp. administrative seat)
- Private and communal wells, private septic tanks/ tile beds

WINCHELSEA (Usborne Twp.)

. Predominantly Residential - little commercial
. Private and communal wells, private septic tank/tile

WOODHAM (Usborne Twp.)

. Predominantly Residential - little commercial
. Private and communal wells, private septic tank/tile

KIRKTON (Usborne Twp.)

. Predominantly Residential - little commercial
. Private wells, private septic tank/tile

BLAKE (Hay Twp. and Stanley Twp.)

. Predominantly Residential - little commercial
. Private wells, private spetic tank/tiles

KIPPEN (Hay Twp., Stanley Twp. and Tuckersmith Twp.)

. Predominantly Residential - little commercial
. Private wells, private septic tank/tiles

HARPURHEY (Tuckersmith Twp. and McKillop Twp.)

. Predominantly Residential - little commercial
. Private wells, private septic tank/tile

BRUCEFIELD (Tuckersmith Twp. and Stanley Twp.)

- Predominantly Residential - little commercial
  - school
- Municipal water system, private spetic tank/tile

VARNA (Stanley Twp.)

- Predominantly Residential - little commercial
- Private wells, private septic tank/tile

HOLMESVILLE (Goderich Twp.)

- Predominantly Residential - little commercial
  - school
- Private; communal wells, private septic tank/tile.

WINTHROP (McKillop Twp.)

- Predominantly Residential - little commercial
- Private wells, private septic tank/tile

WALTON (McKillop Twp., Grey Twp. and Morris Twp.)

- Predominantly Residential - little commercial
- Private wells, private septic tank/tile

CONSTANCE (Hullet Twp.)

- Predominantly Residential - little commercial
- Private wells, private septic tank/tile

LONDESBOROUGH (Hullet Twp.)

- Predominantly Residential - little commercial
- Private wells, private septic tank/tile

SALTFORD (Colborne Twp.)

- Predominantly Residential - little commercial and industrial
- Private and communal wells, private septic tank/tile

CARLOW (Colborne Twp.)

- Predominantly Residential, little commercial and industrial
- Private wells, private septic tank/tile

NILE (Colborne Twp., Ashfield Twp. and West Wawanosh Twp.)

- Predominantly Residential, little commercial
- Private wells, private septic tank/tile

KINGSBRIDGE (Ashfield Twp.)

- Predominantly Residential, little commercial, school
- Private and communal wells, private septic tank/tile

BELFAST (Ashfield Twp. and West Wawanosh Twp.)

- Predominantly Residential, little commercial
- Private wells, private septic tank/tile

KINTAIL (Ashfield Twp.)

- Predominantly Residential, little commercial
- Private and communal wells, private septic tank/tile

AMBERLY (Ashfield Twp.)

- Predominantly Residential, little commercial
- Private and communal wells, private septic tank/tile

LOCHALSH (Ashfield Twp.)

- Predominantly Residential, little commercial
- Private wells, private septic tank/tile

ST. HELEN (W. Wawanosh Twp.)

- Predominantly Residential, little commercial
- Private and communal wells, private septic tank/tile

WHITECHURCH (E. Wawanosh Twp.)

- Predominantly Residential, little commercial
- Private wells, private septic tank/tile

JUNCTIONVILLE (Morris Twp. and Turnberry Twp.)

- Predominantly Residential, little commercial
- Private wells, private septic tank/tile

JAMESTOWN (Morris Twp. and Turnberry Twp.)

- Predominantly Residential, little commercial
- Private wells, private septic tank/tile

CRANBROOK (Grey Twp.)

- Predominantly Residential, little commercial
- Private wells, private septic tank/tile

MOLESWORTH (Grey Twp.)

- Predominantly Residential, little commercial
- Private wells, private septic tank/tile

BELMORE (Turnberry Twp. and Howick Twp.)

- Predominantly Residential, little commercial
- Private wells, private septic tank/tile

LAKELET (Howick Twp.)

- Predominantly Residential, little commercial
- Private wells and septic tank/tile

7.0 ENERGY CONSUMPTION: HURON COUNTY

7.1 Summary of Energy Conservation

The following tables summarize the current (1982) energy consumption pattern in Huron County. The approach is to identify farm energy consumption instead of including this within the industrial sector. The tables are a reasonable estimate given the shortcomings of the available data.

The data for electricity and natural gas consumption are based on actual consumption by sector. The data for propane and petroleum products (oil) are estimates using factors developed for the Ontario Ministry of Energy.

It is apparent that oil consumption is significantly high in Huron County. Approximately 60% of secondary energy is oil-based compared to 36% for all of Ontario. This reflects the limited natural gas availability and the concentration in the urban settlements in the southern part of the County. Industry uses natural gas, where it is available, accounting for the relatively low consumption.

TABLE 7.1

ENERGY CONSUMPTION IN HURON COUNTY, 1982

Sector	Total	Fuel			
		Coal	Gas	Electricity	Oil
Industrial	14%	-	11%	3%	-
Transportation	25%	-	1%	-	24%
Residential	32%	-	6%	11%	15%
Commercial	15%	-	6%	7%	3%
Farm	14%	-	-	1%	12 %
Total	100%	0	24%	22%	54%

Sources of Data

Union Gas Limited
Ontario Hydro
Ministry of Energy. Guide to Community Energy Profiling.
Ministry of Energy. Estimating Energy Consumption for New Development.
Ontario Energy and Agriculture Policy Committee. Volume 2. Summary of Research Findings.

TABLE 7.2

ENERGY CONSUMPTION IN ONTARIO, 1982

Sector	Total	Fuel			
		Coal	Gas	Electricity	Oil
Industrial(includes Farm production)	40%	11%	16%	8%	5%
Transportation	24%	-	1%	-	23%
Residential-Farm	20%	-	10%	5%	5%
Commercial	16%	-	8%	5%	3%
Total	100%	11%	35%	18%	36%

Sources of Data

Statistics Canada. Quarterly Report on Energy Supply/Demand in Canada. 4th Quarter, 1982.

TABLE 7.3

ENERGY CONSUMPTION VOLUMES, HURON COUNTY, 1982

Sector	Total	Fuel		
		Gas	Electricity	Oil
	GJ	GJ	GJ	GJ
Industrial	1,145,400	902,800	216,800	25,800
Transportation	2,103,900	105,200	-	1,998,700
Residential	2,745,900	537,200	901,700	1,307,000
Commercial	1,268,600	431,400	620,800	216,400
Farm	1,154,600	-	67,200	1,087,400
TOTAL	8,418,400	1,976,600	1,806,500	4,635,300

TABLE 7.4

ENERGY CONSUMPTION, INDUSTRIAL SECTOR, 1982

	HURON	ONTARIO
COAL	-	26%
NATURAL GAS	79%	41%
ELECTRICITY	19%	21%
OIL PRODUCTS	2%	12%
TOTAL	100%	100%

DATA NOTES

1. Natural Gas data from Union Gas Limited and estimated according to Table 5 in Guide to Community Energy Profiling.
2. Electricity data from Ontario Hydro.
3. Oil products data estimated according to Table 9 in Guide to Community Energy Profiling.

TABLE 7.5

ENERGY CONSUMPTION, TRANSPORTATION SECTOR, 1982

	HURON	ONTARIO
PROPANE	5%	5%
OIL PRODUCTS	95%	95%
TOTAL	100%	100%

DATA NOTES

1. Distribution assumed similar to Ontario experience.

TABLE 7.6

ENERGY CONSUMPTION, RESIDENTIAL SECTOR, 1982

	HURON	ONTARIO
NATURAL GAS including propane	20%	50%
ELECTRICITY	32%	26%
OIL PRODUCTS	48%	24%
TOTAL	100%	100%

DATA NOTES

1. Residential units by type of space heating and water heating systems derived from Census of Canada, 1981. Report SDW81B15. Occupied Private Dwellings by Main Type of Heating Equipment.
2. Natural gas data from Union Gas Limited.
3. Electricity data from Ontario Hydro.
4. Oil products data estimated according to Table 6 in Guide to Community Energy Profiling.
5. Residential Sector includes seasonal units and farmhouses.

TABLE 7.7

ENERGY CONSUMPTION, COMMERCIAL SECTOR, 1982

	HURON	ONTARIO
NATURAL GAS	34%	48%
ELECTRICITY	49%	30%
OIL PRODUCTS	17%	22%
TOTAL	100%	100%

DATA NOTES

1. Natural gas data from Union Gas Limited.
2. Electricity data from Ontario Hydro.
3. Oil products data estimated according to Table 7 in Guide to Community Energy Profiling.

TABLE 7.8

ENERGY CONSUMPTION, FARM SECTOR, 1982

	HURON
ELECTRICITY	6%
OIL PRODUCTS	94%
TOTAL	100%

DATA NOTES

1. Energy consumption factors in GJ per hectare for farm production and GJ per animal unit for livestock and poultry derived from Volume 2 of Ontario Energy and Agriculture Policy Committee.
2. Data on hectares and animal units derived from Census of Agriculture, 1981, produced by Statistics Canada.

TABLE 7.9

HURON COUNTY

RESIDENTIAL DWELLINGS (FARM & NON-FARM)

1981

PRINCIPAL SPACE HEATING FUEL

PERCENTAGE OF OCCUPIED DWELLINGS

MUNICIPALITY	OIL	GAS OR PROPANE	ELECTRICITY	OTHER	TOTAL
ASHFIELD TWP.	62%	4%	20%	14%	100%
COLBORNE TWP.	63%	6%	22%	9%	100%
E. WAWANOSH TWP.	55%	3%	12%	30%	100%
GODERICH TWP	46%	15%	17%	22%	100%
GREY TWP.	55%	2%	16%	27%	100%
HAY TWP.	61%	4%	24%	11%	100%
HOWICK TWP.	62%	2%	12%	24%	100%
HULLETT TWP.	71%	2%	10%	17%	100%
MCKILLOP TWP.	60%	10%	15%	15%	100%
MORRIS TWP.	60%	3%	17%	20%	100%
STANLEY TWP.	63%	5%	17%	15%	100%
STEPHEN TWP.	43%	21%	31%	5%	100%
TUCKERSMITH TWP.	64%	20%	8%	8%	100%
TURNBERRY TWP.	53%	1%	21%	25%	100%
USBORNE TWP.	78%	6%	9%	7%	100%
W. WAWANOSH TWP.	59%	4%	8%	29%	100%
TOTAL TOWNSHIPS	58%	9%	17%	16%	100%
CLINTON	30%	50%	19%	1%	100%
EXETER	44%	24%	32%	0%	100%
GODERICH	21%	55%	23%	1%	100%
SEAFORTH	17%	62%	20%	1%	100%
WINGHAM	66%	2%	31%	1%	100%
BAYFIELD	33%	3%	60%	4%	100%
BLYTH	72%	6%	18%	4%	100%
BRUSSELS	77%	0%	23%	0%	100%
HENSALL	66%	11%	23%	6%	100%
ZURICH	57%	1%	41%	1%	100%
TOTAL TOWNS & VILLAGES	39%	34%	26%	1%	100%
TOTAL COUNTY	49%	20%	22%	9%	100%

TABLE 7.10

HURON COUNTY

RESIDENTIAL DWELLINGS (FARM & NON-FARM)

1981

PRINCIPAL WATER HEATING FUEL

PERCENTAGE OF OCCUPIED DWELLINGS

MUNICIPALITY	OIL	GAS OR PROPANE	ELECTRICITY	OTHER	TOTAL
ASHFIELD TWP.	3%	2%	92%	3%	100%
COLBORNE TWP.	4%	3%	91%	2%	100%
E. WAWANOSH TWP.	0%	6%	94%	0%	100%
GODERICH TWP.	4%	14%	82%	0%	100%
GREY TWP.	1%	3%	93%	3%	100%
HAY TWP.	1%	5%	93%	1%	100%
HOWICK TWP.	4%	4%	88%	4%	100%
HULLETT TWP.	2%	0%	98%	0%	100%
MCKILLOP TWP.	2%	4%	90%	4%	100%
MORRIS TWP.	2%	2%	94%	2%	100%
STANLEY TWP.	4%	5%	90%	1%	100%
STEPHEN TWP.	4%	11%	85%	0%	100%
TUCKERSMITH TWP.	4%	11%	85%	0%	100%
TURNBERRY TWP.	6%	3%	88%	5%	100%
USBORNE TWP.	2%	2%	96%	0%	100%
W. WAWANOSH TWP.	3%	3%	86%	8%	100%
TOTAL TOWNSHIPS	3%	6%	90%	1%	100%
CLINTON	3%	31%	66%	0%	100%
EXETER	2%	15%	83%	0%	100%
GODERICH	2%	39%	59%	0%	100%
SEAFORTH	0%	33%	67%	0%	100%
WINGHAM	4%	1%	95%	0%	100%
BAYFIELD	2%	0%	98%	0%	100%
BLYTH	0%	6%	94%	0%	100%
BRUSSELS	5%	0%	95%	0%	100%
HENSALL	6%	7%	86%	1%	100%
ZURICH	4%	0%	96%	0%	100%
TOTAL TOWNS & VILLAGES	3%	22%	75%	0%	100%
TOTAL COUNTY	3%	13%	83%	1%	100%

7.2 Agricultural Energy Consumption Patterns

Although the Farm Sector accounts for 14% of estimated consumption, agriculture is a major economic force in the County. For this reason particular attention is made to this sector.

To sort out the application of available agricultural energy conservation measures to agriculture in Huron County, it is appropriate to first document energy consumption patterns relevant to the different types of agricultural activity found in the County.

Once again, the research documentation for the Report of the Ontario Energy and Agriculture Policy Committee is an invaluable reference source for characterizing consumption patterns among the varying agricultural activities found in the Province. For this Study the Committee's data was supported by additional statistical data available from Statistics Canada, (Farm Energy Use, 1981) and other available background Reports, as listed in the Source Material. The Statistics Canada Report provides regionally summarized facts and figures derived from a nation wide "Farm Energy Use Survey" conducted in June and July of 1982.

Published 1982 Provincial Agricultural Statistics, summarized by Township within the County, provides the Township level characterization of agricultural production found in a later section. This, together with the discussion on energy consumption patterns by farm type, provides a basis for some predictive analysis of farm energy use in the County. This allows for more knowledgeable discussion of the applicability, achievability, and acceptability of various known agricultural non-planning measures in the County.

Ontario food production energy dollar expenditures in 1978 are broken down as follows:

FOOD PRODUCTION COMPONENT	PERCENTAGE OF TOTAL ENERGY DOLLAR EXPENDITURE (Ontario, 1978)	
swine	3%	
beef	4%	
poultry	8%	
dairy	9%	
TOTAL ANIMAL PRODUCTION		24%
herbicides and pesticides	3%	
grain drying	4%	
greenhouse vegetables and mushrooms	5%	
field operations	18%	
fertilizers	33%	
TOTAL CROP PRODUCTION		63%
TRANSPORTATION		13%
TOTAL		100%

In 1980, the direct on-farm energy costs for fuel and electricity in agriculture were on average about 18% of total production costs. When fertilizers, herbicides and pesticides are added, as in cash cropping operations, the proportion of total energy costs rises substantially. For example, energy as a proportion of operating costs in sample farms in Ontario, (1980) were as follows:

FARMS	ENERGY AS A % OF OPERATING COSTS
Dairy	14%
Beef Feed Lot	7%
Cash Crops (some livestock)	34%
Provincial Average	18%

More specifically, energy costs as a percentage of total production costs for individual crops, (crop per ha production cost basis rather than total farm operating cost basis) breaks down as follows for agricultural crops typically found growing in Huron County.

CROP	ENERGY % OF TOTAL CROP PRODUCTION COST per ha
Grain Corn	7.4%
Oats	4.3%
Mixed Grain	5.9%
Barley	5.9%
White Beans	3.3%
Silage Corn	7.7%
Winter Wheat	5.3%
Soybeans	2.9%
Improved Pasture	4.7%
Hay	7.6%
Rutabagas	2.3%
Processing Peas	2.2%
Sweet Corn	5.0%
Apples	1.8%
Potatoes	5.3%
Cauliflower	1.9%

Generally, as costs of production go up for the more intensive crops, the energy expenditure, as a proportion begins to fall.

Similar analyses for livestock and related production common to the County reveal the following statistics:

PRODUCTION TYPE	ENERGY % OF TOTAL PRODUCTION COST
milk	4.3%
beef	2.2%
pork	2.1%
eggs	3.0%
sheep	0.5%
poultry	
- chicken broilers	4.6%
- turkey broilers	4.4%
- heavy turkeys	3.0%

Transportation costs also vary considerably among crops grown in Huron. This is illustrated by the following:

CROP		TRANSPORTATION ENERGY AS A % OF TOTAL ENERGY COSTS (OFF-FARM)
Grain Corn		6.7%
Oats		13.6%
Mixed Grain		11.6%
Barley		11.6%
White Beans		4.0%
Winter Wheat		8.8%
Soybeans		6.9%
Rutabagas		77.5%
Processing Peas		86.7%
Sweet Corn	fresh	28.0%
	processing	55.6%
Apples		44.5%
Potatoes		44.6%
Cauliflower		64.1%

Transportation energy cost relationships for livestock commodities are as follows:

COMMODITY	ENERGY % OF TOTAL PRODUCTION (OFF-FARM)
milk	10.4%
beef	39.7%
pork	13.1%
eggs (and fowl)	36.5%
poultry	
- chicken broilers	7.8%
- turkey broilers	6.6%
- heavy turkey	8.0%

As of 1981, about 80% of farm field operations in the Province depended on diesel fuel derived from crude oil. Long term opportunities may exist for use of propane and compressed natural gas in farm machinery however, substantial developmental work remains to be done to make such conversions economically feasible.

Motors and lighting on the farm are primarily powered by electricity. Propane and natural gas are becoming of increasing importance for crop drying and space heating. On a province-wide basis, the forms of energy consumption in agriculture include the following:

AGRICULTURAL ENERGY CONSUMPTION	PERCENTAGE OF TOTAL	
heating oil	13%	
diesel fuel	26%	
gasoline	9%	
TOTAL PETROLEUM-BASED		48%
electricity	9%	
propane	3%	
natural gas (mostly for fertilizer manufacture)	40%	
TOTAL OTHER		52%
TOTAL	100%	100%

Provincial figures (1978) are also available from which it is possible to calculate per unit area or unit of production energy consumption figures. Figures calculated for production types common to Huron County are included below and include pesticides and herbicides.

CROP	ENERGY CONSUMPTION (GJ/ha in 1978) (gigajoules per hectare)
Grain Corn	18.0
Silage Corn	1.5
Barley	6.0
Mixed Grains	6.0
Oats	4.6
White Beans	5.5
Winter Wheat	8.2
Soybeans	3.8
Hay	5.0
Improved Pasture	2.6
Rutabagas	12.6
Processing Peas	5.6
Sweet Corn - fresh	12.2
- processing	12.0
Apples	32.1
Potatoes	25.3
Cauliflower	23.5

COMMODITY TYPE	TOTAL ENERGY CONSUMPTION (ONTARIO)					
	Gas (	Diesel litres	Fuel Oil	Propane)	Nat. Gas (m^3)	Elect. (kWh)
Sheep (per ewe, per year)	-	0.9	-	-	-	9.0
Beef (per finished steer)	0.5	10.9	0.9	-	1.7	73.0
Milk (per cow)	-	27.3	-	-	-	630.0
Egg (per 100 birds per annum)	11.4	37.3	30.9	13.6	47.3	780.0
Pork (per finished hog)	0.2	2.1	0.5	0.7	0.7	63.0
Broiler Chickens (per 100 birds)	9.1	35.0	100.0	136.4	121.6	750.0
Turkey Broilers (per 100 birds)	3.2	10.9	5.9	77.3	21.6	253.0
Heavy Turkeys (per 100 birds)	7.3	27.3	15.0	77.3	39.3	326.0

Research undertaken by Stevenson K.R. and N.C. Stoskopf[1] compared fuel requirements for selected farming operations in 1974. Interesting comparisons can be made in fuel required per unit area for different types and degrees of tillage, although no offsetting energy expenditures for varying herbicide and pesticide applications are given.

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[1] Reported in "Energy and Agriculture". Proceedings of the Ontario Institute of Agrologists, Fifteenth Annual Conference - Guelph Branch OIA, AIC, 1974.

Fuel requirements for selected farming operations.

OPERATION	FUEL REQUIRED (l/ha) Gasoline	Diesel
Moldboard Plow	26.1	18.6
Chisel Plow	17.4	12.6
Field Cultivator	6.5	4.7
Disc	7.6	5.5
Conventional Corn Planting	4.9	3.6
No-tillage Planting	2.5	1.8
Spraying	1.6	1.1
Row Crop Cultivator	5.4	3.8
Combine - Small Grain	10.3	7.4
Combine - Corn	3.6	2.6

It is predicted that biomass energy production from agriculture may become a significant source of energy to offset agricultural energy comsumption over the next two decades. The issue of using foodlands for energy use is raised by this resource consideration. The Ministry of Energy has proposed two targets for energy production from agricultural and related biomass: to obtain 3.6 million barrels of oil equivalent from agricultural wastes and crops and 5.9 million barrels of oil equivalent from hybrid poplar production by 1995. Ethanol, methanol and oilseed crops are the main biomass energy sources identifiable from agricultural crop production.

7.3 Huron County Agriculture

The Statistics indicate that Provincial energy requirements for food production, including energy inputs of fertilizers and pesticides, represents 3% of the total energy use in the province. This figure provides a provincial overview which includes urbanized metropolitan areas and northern forestry and mining areas, where residential, commercial and industrial uses dominate. In Huron however, the predominating agricultural character of the County increases the agriculture of food production energy use component of overall County energy consumption to 14% of total energy consumption.

The agricultural character of the County and its position as one of the leading agricultural producers of the Province is reflected by the following (1982) agricultural statistics.

- 3,790 Census Farms
- 88% farm land
- 75% improved farm land (highest in the Province*)
- 1st in barley*
- 1st in white beans*
- 1st in rutabagas*
- 1st in silage corn*
- 1st in total hogs*
- 1st in total cattle*
- 1st in oats*
- 2nd in cattle marketings*
- 2nd in winter wheat*
- 2nd in hog marketings*
- 2nd in poultry*
- 2nd in total corn*
- 3rd in grain corn*

The most common crop grown in Huron County is grain corn which, in 1982, covered 72,441 ha (179,000 ac.) or 32% of all cropped land. The combined acreage of the next two most commonly grown crops (mixed grains and hay) of 64,752 ha (160,000 ac.) or 29% of all cropped land. The remaining 39% is of varied crop production in the County.

The fact that the Huron County economy is dominated by agricultural activity leads to a rationale for emphasis on policies and measures supportive of energy conservation in the agricultural sector. There is only limited amount of control over the design and operational aspects of agricultural activities which is exerted in the Official Plan. This however, should not deter the County from adopting and encouraging policies supportive of the non-planning measures which can add substantially to the achievement of the overall goal of energy conservation in the County.

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* of all other Counties and Regional Municipalities reporting in the Province.

7.4 Energy Consumption Experience in Settlements

7.4.1 Summary

Data has been collected on a settlement, Township and County basis. This information was taken from the ten Government energy handbooks, municipal records and data provided by Huron County.

The information obtained has been used to establish a base from which to compare the settlements of Huron County. In some areas, the information required to establish meaningful relationships is not available. These areas suggest further investigation may be warranted in the future.

All relevant information and calculated results are summarized and presented in tabular form. Three main summary tables are presented and form the basis for investigating the energy cost implications for the proposed measures. A general discussion of the tables follows.

TABLE 7.11 - EXISTING MUNICIPAL DATA

This is a summary of available data required to characterize each settlement as a basis for establishing cost indices. Settlement population and commercial services in addition to general physical servicing information are presented.

TABLE 7.12 - ENERGY PRICE & SPACE HEATING COST INDICES

Six forms of energy were considered for Huron County. They consist of electricity, natural gas, propane, gasoline, diesel and heating oil. Unit energy prices for each, relative to Huron, are presented in Table 2. Energy prices are compared by conversion to a common energy unit - the Joule. The variation in prices per Gigajoule, GJ for each fuel can be seen on Table 7.12.

Space heating costs for the annual operation of a typical single family residential bungalow have been established. This annual cost per unit considers geographical location and furnace efficiency. Geographical location is represented by the heating degree day factor. The greater the heating degree days for an area, the more energy is required to heat the typical residence. An explanation of how the results were arrived at can be found in the Method of Calculation section.

TABLE 7.13 - PERSONAL TRANSPORTATION AND MUNICIPAL SERVICES ENERGY COST INDICES

This table summarizes the annual cost per household for school bus transportation, farm and non-farm residential transportation. The actual calculations can be found in the Method of Calculation section.

Municipal road maintenance information is unavailable, in the form which is required for this study. No meaningful relationship can be established from this data. Further study may be considered so that this information will be useful and representative of the municipalities in Huron County.

Annual sanitary sewerage and water supply operational cost information is incomplete but do provide representative values for comparison. Service population and system types are given on Table 7.11.

TABLE 7.11

HURON COUNTY ENERGY CONSERVATION STUDY
- EXISTING MUNICIPAL DATA

		SETTLEMENT DATA						ROADS	SANITARY SEWERAGE			WATER SUPPLY		SOLID WASTE		
		TYPE	POP.	AREA HA.	UNITS	UNITS PER HA	DEVELOP-MENT TYPE	KM.	TYPE	FLOW M3/D	SPARE POP CAPACITY	TYPE	SPARE POP CAPACITY	LOCATED IN TWP #	SERVICE POP.	TONS PER
	HURON COUNTY		56130	340273	22810	0									58060	[illegible]
1	BAYFIELD	3A	634	290	545	2	C ID R RS	31	PRI					14		
2	BLYTH	2	930	249	330	1	IDS RM		MUM	730	1887	MUW		18		
3	BRUSSELS	2	960	233	370	2	IDS RM		MUM	636	1092	MUW	926	20		
4	CLINTON	1	2930	413	1210	3	C IDS RM	37	MUM	1818	565	MUW	1828	14		
5	EXETER	1	3680	487	1580	3	C IDS RM		MUP	2559		MUW	2372	16	3700	[illegible]
6	GODERICH	1	7740	645	3050	5	C IDS RM	70	MUM	9050	1930	MUL	3771	14		
7	HENSALL	2	970	179	390	2	IDS RM		MUP	568	387	MUW		25	1577	600
8	SEAFORTH	1	2100	241	860	4	C IDS RM	21	MUP	1227		MUW	5932	23		
9	WINGHAM	1	3030	243	1260	5	C IDS RM		MUP	1364		MUW	2859	13	2934	[illegible]
10	ZURICH	2	1130	104	310	3	IDS RM		MUP	523	145	MUW	876	16		
11	ASHFIELD		1783	26879	1167	0			PRI					11	1783	[illegible]
11.1	AMBERLY	3B	30		10		C R		PRI							
11.2	BELFAST	3B	30		8		C R		PRI							
11.3	DUNGANNON	3A	412		125		C R		PRI							
11.4	KINGSBRIDGE	3B	24		8		C IS R		PRI							
11.5	KINTAIL	3B	24		8		C R		PRI							
11.6	LOCHALSH	3B	30		10		C R		PRI							
11.7	PORT ALBERT	3A	172		72		C R		PRI							
12	COLBORNE		1772	14434	1005	0			PRI					14		
12.1	BENMILLER	3A	210		68		C ID R		PRI							
12.2	CARLOW	3B	72		24		C ID R		PRI							
12.3	NILE	3B	49		15		C R		PRI							
12.4	SALTFORD	3B	112		47		C ID R		PRI							
13	EAST WAWANOSH		1110	17407	358	0		128	PRI					13	1110	400
13.1	BELGRAVE	3A	480		151		C R		PRI							
13.2	WHITECHURCH	3B	38		12		C R		PRI							
14	GODERICH		2427	22533	1123	0		168	PRI					14	17000	10100
14.1	HOLMESVILLE	3B	119		35		C IS P		PRI							
15	GREY		2000	26887	659	0			PRI					15	3725	[illegible]
15.1	CRANBROOK	3B	139		46		C R		PRI							
15.2	ETHEL	3A	227		69		C R		PRI							
15.3	MOLESWORTH	3B	115		34		C R		PRI							
16	HAY		1945	22157	1362	0		174	PRI					16	2724	1400
16.1	BLAKE	3B	74		25		C R		PRI							
16.2	KIPPEN	3B	139		43		C R		PRI							
17	HOWICK		3106	30282	1083	0		225	PRI					17	3106	1100
17.1	FORDWICH	3A	425		152		C R		PRI							
17.2	GORRIE	3A	545		188		C R		PRI							
17.3	LAKELET	3B	77		22		C R		PRI							
17.4	WROXETER	3A	389		139		C R		PRI							
18	HULLETT		1900	21738	584	0		150	PRI					18	2832	1000
18.1	CONSTANCE	3B	87		23		C R		PRI							
18.2	LONDESBOROUGH	3B	102		49		C R		PRI							
19	McKILLOP		1473	22077	436	0		202	PRI					15		
19.1	WALTON	3B	128		41		C R		PRI							
19.2	WINTHROP	3B	80		23		C R		PRI							
20	MORRIS		1680	22924	578	0			PRI					20	2498	900
20.1	BLUEVALE	3A	339		108		C R		PRI							
20.2	JAMESTOWN	3B	7		20		C R		PRI							
20.3	JUNCTIONVILLE	3B	64		34		C R		PRI							
21	STANLEY		1598	18935	1005	0		140	PRI					21	1598	1100
21.1	VARNA	3B					C R		PRI							
22	STEPHEN		4204	24113	1672	0			PRI					22	4200	[illegible]
22.1	CENTRALIA	3A	217		68		C R RET		PRI							
22.2	CREDITON	3A	389		139		C R		PRI							
22.3	CORBETT	3B	41		13		C R		PRI							
22.4	DASHWOOD	3A	496		160		C ID R		PRI							
22.5	GREENWAY	3B	41		13		C R		PRI							
22.6	HURON PARK	1	570		360		C IDS RM		MUM	1818	455	MUW	599			
22.7	MOUNT CARMEL	3B	49		14		C IS R		PRI							
22.8	SHIPKA	3B	64		20		C R		PRI							
23	TUCKERSMITH		3035	17212	946	0		151	PRI					23	4900	2500
23.1	BRUCEFIELD	3B	128		40		C IS R		PRI			MUW				
23.2	EGMONDVILLE	3A	576		132		C R		PRI			PARTIAL BY SEAFORTH				
23.3	HARPURHEY	3B	87		30		C R		PRI							
23.4	VANASTRA	2	550		240		IDS RM		MUM	1405	834	MUW	FROM CLINTON			
24	TURNBERRY		1470	14639	531	0			PRI					24	1470	600
24.1	BELMORE	3B					C R		PRI							
25	USBORNE		1630	17837	524	0		168	PRI					25	1509	[illegible]
25.1	ELIMVILLE	3B	112		35		C IS R		PRI							
25.2	KIRKTON	3B	71		21		C R		PRI							
25.3	WINCHESEA	3B	73		23		C R		PRI							
25.4	WOODHAM	3B	73		22		C R		PRI							
26	WEST WAWANOSH		1394	17135	434	0		122	PRI					26	1394	[illegible]
26.1	AUBURN	3A	316		93		C R		PRI							
26.2	ST. HELENS	3B	57		15		C R		PRI							

TABLE 7.12

HURON COUNTY ENERGY CONSERVATION STUDY
- ENERGY PRICE AND SPACE HEATING COST INDICES

		UNIT ENERGY COSTS-$												SPACE HEATING - TYPICAL UNIT									
		ELECT.		NAT.GAS		PROPANE		GASOLINE		DIESEL		HEAT OIL		ELECT		NAT.GAS		PROPANE		OIL		OTHER	
		KWH	GJ	M3	GJ	L	GJ	L	GJ	L	GJ	L	GJ	%	$	%	$	%	$	%	$	%	$
HURON COUNTY																							
1	BAYFIELD	.042	11.6			.25	9.79	.477	13.7	.48	12.4	.314	7.52	60	1426	0	1161	3	1989	33	1533	4	
2	BLYTH	.047	13.0			.25	9.79	.477	13.7	.48	12.4	.314	7.52	18	1789	0	1302	6	2231	73	1719	3	
3	BRUSSELS	.044	12.2			.25	9.79	.477	13.7	.48	12.4	.314	7.52	22	1740	0	1352	0	2316	78	1785	0	
4	CLINTON	.044	12.2	.21	5.70	.25	9.79	.477	13.7	.48	12.4	.314	7.52	20	1577	53	1226	0	2100	27	1618	0	
5	EXETER	.044	12.2	.21	5.70	.25	9.79	.477	13.7	.48	12.4	.314	7.52	32	1588	30	1234	1	2115	37	1630	0	
6	GODERICH	.044	12.2	.21	5.70	.25	9.79	.477	13.7	.48	12.4	.314	7.52	23	1513	57	1176	0	2014	20	1552	0	
7	HENSALL	.045	12.5	.21	5.70	.25	9.79	.477	13.7	.48	12.4	.314	7.52	23	1651	17	1255	0	2150	60	1657	0	
8	SEAFORTH	.046	12.7	.21	5.70	.25	9.79	.477	13.7	.48	12.4	.314	7.52	20	1759	63	1308	0	2241	11	1727	0	
9	WINGHAM	.044	12.2			.25	9.79	.477	13.7	.48	12.4	.314	7.52	31	1683	0	1308	1	2241	66	1727	2	
10	ZURICH	.045	12.5			.25	9.79	.477	13.7	.48	12.4	.314	7.52	41	1558	0	1184	2	2029	57	1564	0	
11	ASHFIELD	.043	11.9			.25	9.79	.477	13.7	.48	12.4	.314	7.52	20	1515	0	1205	4	2065	62	1591	14	
11.1	AMBERLY	.043	11.9																				
11.2	BELFAST	.043	11.9																				
11.3	DUNGANNON	.043	11.9																				
11.4	KINGSBRIDGE	.043	11.9																				
11.5	KINTAIL	.043	11.9																				
11.6	LOCHALSH	.043	11.9																				
11.7	PORT ALBERT	.043	11.9																				
12	COLBORNE	.044	12.2			.25	9.79	.477	13.7	.48	12.4	.314	7.52	22	1569	0	1220	5	2030	63	1610	10	
12.1	BENMILLER	.044	12.2																				
12.2	CARLOW	.044	12.2																				
12.3	NILE	.044	12.2																				
12.4	SALTFORD	.044	12.2																				
13	EAST WAWANOSH	.044	12.2			.25	9.79	.477	13.7	.48	12.4	.314	7.52	13	1664	0	1293	3	2216	54	1707	30	
13.1	BELGRAVE	.044	12.2																				
13.2	WHITECHURCH	.044	12.2																				
14	GODERICH	.044	12.2	.21	5.70	.25	9.79	.477	13.7	.48	12.4	.314	7.52	17	1532	11	1190	5	2040	47	1572	20	
14.1	HOLMESVILLE	.044	12.2																				
15	GREY	.045	12.5			.25	9.79	.477	13.7	.48	12.4	.314	7.52	16	1738	0	1367	2	2342	55	1804	27	
15.1	CRANBROOK	.045	12.5																				
15.2	ETHEL	.045	12.5																				
15.3	MOLESWORTH	.045	12.5																				
16	HAY	.045	12.5			.25	9.79	.477	13.7	.48	12.4	.314	7.52	24	1566	0	1190	5	2040	61	1572	10	
16.1	BLAKE	.045	12.5																				
16.2	KIPPEN	.045	12.5																				
17	HOWICK	.044	12.2			.25	9.79	.477	13.7	.48	12.4	.314	7.52	12	1747	0	1358	2	2326	61	1793	25	
17.1	FORDWICH	.044	12.2			.25	9.79	.477	13.7	.48	12.4	.314	7.52		1758		1367		2342		1804		
17.2	GORRIE	.044	12.2			.25	9.79	.477	13.7	.48	12.4	.314	7.52		1740		1352		2316		1785		
17.3	LAKELET	.044	12.2																				
17.4	WROXETER	.044	12.2			.25	9.79	.477	13.7	.48	12.4	.314	7.52		1732		1346		2306		1777		
18	HULLETT	.045	12.5			.25	9.79	.477	13.7	.48	12.4	.314	7.52	10	1690	0	1284	2	2201	71	1696	17	
18.1	CONSTANCE	.045	12.5																				
18.2	LONDESBOROUGH	.045	12.5																				
19	McKILLOP	.045	12.5			.25	9.79	.477	13.7	.48	12.4	.314	7.52	16	1760	0	1337	9	2291	59	1766	16	
19.1	WALTON	.045	12.5																				
19.2	WINTHROP	.045	12.5																				
20	MORRIS	.044	12.2			.25	9.79	.477	13.7	.48	12.4	.314	7.52	18	1709	0	1328	3	2276	60	1754	19	
20.1	BLUEVALE	.044	12.2																				
20.2	JAMESTOWN	.044	12.2																				
20.3	JUNCTIONVILLE	.044	12.2																				
21	STANLEY	.044	12.2			.25	9.79	.477	13.7	.48	12.4	.314	7.52	16	1532	0	1190	5	2040	62	1572	17	
21.1	VARNA	.044	12.2																				
22	STEPHEN	.044	12.2	.21	5.70	.25	9.79	.477	13.7	.48	12.4	.314	7.52	31	1513	21	1176		2014	43	1552	5	
22.1	CENTRALIA	.044	12.2																				
22.2	CREDITON	.044	12.2																				
22.3	CORBETT	.044	12.2																				
22.4	DASHWOOD	.044	12.2																				
22.5	GREENWAY	.044	12.2																				
22.6	HURON PARK	.044	12.2									.314	7.52		1539		1196		2050		1579		
22.7	MOUNT CARMEL	.044	12.2																				
22.8	SHIPKA	.044	12.2																				
23	TUCKERSMITH	.046	12.7	.21	5.70	.25	9.79	.477	13.7	.48	12.4	.314	7.52	8	1700	12	1264	8	2165	64	1668	8	
23.1	BRUCEFIELD	.046	12.7																				
23.2	EGMONDVILLE	.046	12.7																				
23.3	HARPURHEY	.046	12.7																				
23.4	VANASTRA	.046	12.7			.25	9.79	.477	13.7	.48	12.4	.314	7.52		1652		1229		2105		1622		
24	TURNBERRY	.044	12.2			.25	9.79	.477	13.7	.48	12.4	.314	7.52	22	1702	0	1323	1	2256	53	1746	24	
24.1	BELMORE	.044	12.2																				
25	USBORNE	.044	12.2	.21	5.70	.25	9.79	.477	13.7	.48	12.4	.314	7.52	9	1607	3	1249	3	2140	78	1649	7	
25.1	ELIMVILLE	.044	12.2																				
25.2	KIRKTON	.044	12.2																				
25.3	WINCHESEA	.044	12.2																				
25.4	WOODHAM	.044	12.2																				
26	WEST WAWANOSH	.045	12.5			.25	9.79	.477	13.7	.48	12.4	.314	7.52	7	1644	0	1249	3	2140	59	1649	31	
26.1	AUBURN	.045	12.5																				
26.2	ST. HELENS	.045	12.5																				

TABLE 7.13 HURON COUNTY ENERGY CONSERVATION STUDY
-PERSONAL TRANSPORTATION AND MUNICIPAL SERVICES ENERGY COST INDICES

	TRANSPORTATION			ROADS			SANITARY SEWERAGE		WATER SUPPLY		SOLID WASTE			
	SCHOOL BUS $/HOUSE	ANNUAL FARM $/HOUSE	ANNUAL NON-FARM $/HOUSE	KM	AVE L	$/KM	$	$/POP	$	$/POP	SERVICE POP.	$	$/POP	ANNUAL STREET LIGHTING COST
HURON COUNTY											58060			163556
1 BAYFIELD			340	31	5429									
2 BLYTH			276											8917
3 BRUSSELS			355											6875
4 CLINTON			222	37	NA		18000	6.14	18000	6.14				22319
5 EXETER			296				4484	1.22	1648	.45	3700			27657
6 GODERICH			112	70	53991		25389	3.28						49359
7 HENSALL			355				1840	1.90	2649	2.73	1577			6140
8 SEAFORTH			296	21	21025		4389	2.17	3966	1.89				18961
9 WINGHAM			355				3047	1.05	12496	4.12	2934			16442
10 ZURICH			400				1008	1.28	6559	5.80				6286
11 ASHFIELD	25	1633	1350								1783			
11.1 AMBERLY														
11.2 BELFAST														
11.3 DUNGANNON														
11.4 KINGSBRIDGE														
11.5 KINTAIL														
11.6 LOCHALSH														
11.7 PORT ALBERT														
12 COLBORNE	14	1096	671											
12.1 BENMILLER														
12.2 CARLOW														
12.3 NILE														
12.4 SALTFORD														
13 EAST WAWANOSH	63	1868	1619	128	30914						1110			
13.1 BELGRAVE														
13.2 WHITECHURCH														
14 GODERICH	23	1096	919	168	34333						17000			
14.1 HOLMESVILLE														
15 GREY	41	2563	2031								3725			
15.1 CRANBROOK														
15.2 ETHEL														
15.3 MOLESWORTH														
16 HAY	21	1424	999	174	51393						2724			
16.1 BLAKE														
16.2 KIPPEN														
17 HOWICK	29	2520	1422	225	59087						3106			
17.1 FORDWICH														
17.2 GORRIE														
17.3 LAKELET														
17.4 WROXETER														
18 HULLETT	51	1205	1205	150	33172						2832			
18.1 CONSTANCE														
18.2 LONDESBOROUGH														
19 McKILLOP	40	1096	1096	202	45615									
19.1 WALTON														
19.2 WINTHROP														
20 MORRIS	53	1676	1073								2498			
20.1 BLUEVALE														
20.2 JAMESTOWN														
20.3 JUNCTIONVILLE														
21 STANLEY	23	1972	1157	140	45115						1598			
21.1 VARNA														
22 STEPHEN	22	1534	1180								4200			
22.1 CENTRALIA														
22.2 CREDITON														
22.3 CORBETT														
22.4 DASHWOOD														
22.5 GREENWAY														
22.6 HURON PARK														
22.7 MOUNT CARMEL														
22.8 SHIPKA														
23 TUCKERSMITH	29	1152	904	151							4900			
23.1 BRUCEFIELD														
23.2 EGMONDVILLE														
23.3 HARPURHEY														
23.4 VANASTRA							7606	12.68	11000	20.00				
24 TURNBERRY	52	877	664								1470			
24.1 BELMORE														
25 USBORNE	34	1096	1344	168	43212						1509			
25.1 ELIMVILLE														
25.2 KIRKTON														
25.3 WINCHESEA														
25.4 WOODHAM														
26 WEST WAWANOSH	32	1824	1647	122	37264						1394			
26.1 AUBURN														
26.2 ST. HELENS														

EXPLANATORY NOTES FOR DATA TABLES

3 tables have been prepared for presentation of our assessment of comparative costs for space heating, transportation and municipal services energy consumption in Huron County. Subject to data limitations, these costs are established for each settlement or representative groups of settlements, within Huron County.

TABLE 7.11 - EXISTING MUNICIPAL DATA

Existing data are presented in tabular form to consolidate existing information.

SETTLEMENT DATA

1) Type - type of settlement (1, 2, 3A or 3B)
2) Pop - settlement population
3) Area Ha - Area in hectares
4) Units - number of households
5) Units per Ha - number of households per hectare
6) Development Type - a list of the types of development within each settlement:

SYMBOL	DEVELOPMENT TYPE
C	Commercial
F	Farm
ID	Industrial
IDS	Industrial & Institutional
IS	Institutional
R	Residential Single Family
RET	Residential - Retirement
RM	Residential Multiple
RS	Residential Seasonal

SOURCE - Settlement data taken from assessment and census material and the 1983 Municipal Directory published by the Ministry of Municipal Affairs and Housing.

ROADS

KM - kilometers of municipal and country roads

SOURCE - Road data received from Huron County.

SANITARY SEWERAGE

1) Type - type of sewage treatment

SYMBOL	TYPE
MUM	Municipal Mechanical
MUP	Municipal Ponds
PRI	Private systems

2) Flow M3/D - daily municipal sanitary sewage flow capacity in cubic meters

3) Spare Pop Capacity - spare capacity of works in terms of population.

WATER SUPPLY

Type - type of water supply system

SYMBOL	TYPE
MUL	Municipal - Lake
MUW	Municipal - Well
PRI	Communal/Individual Private Systems

Spare Pop Capacity - spare capacity of works in terms of population.

SOLID WASTE

1) Located in Twp # - number designating Township in which solid waste site located. Townships are numbered from 11 to 26, inclusive.

2) Service Pop - the population serviced by the solid waste site.

3) Tons per Yr - the annual tonnage of waste at the site.

SOURCE - sanitary sewerage, water supply and solid waste information supplied by the Ministry of the Environment.

TABLE 7.12 - ENERGY PRICE AND SPACE HEATING COST INDICES

UNIT ENERGY COSTS -

1) Elect - Electricity cost per (a) kilometre
(b) billion joules

SOURCE - 1982 hydro data from Ontario Hydro entitled "Customers, Energy and Revenue Statistics by Type of Costomer".

2) Nat. Gas - Natural Gas cost per (a) cubic metre
(b) billion joules

SOURCE - 1983 Union Gas service rate schedule based on 0 to 1400 cubic metres/month.

3) Propane - propane cost per (a) litre
(b) billion joules

4) Gasoline - gasoline cost per (a) litre
(b) billion joules

5) Diesel - diesel fuel cost per (a) litre
(b) billion joules

6) Heat Oil - heating oil cost per (a) litre
(b) billion joules

SOURCE - propane, gasoline, diesel, and heating oil costs are based on 1984 prices as received from the Huron County Planning Department. Conversion of all fuels, to Joule energy units, are based on standard values.

SPACE HEATING - TYPICAL UNITS

The annual heating cost for a typical dwelling unit using one of the available forms of energy. A typical unit is assumed to use 130,000 MJ of energy a year.

There are 5 alternative forms of fuel available, to some degree, in Huron County. For each available form, in each settlement, a comparison is made of:

% percentage of households using that form of energy for space heating; and

$ the approximate annual cost for the number of GJ required to heat the household. These annual costs consider the effect of heating degree days for each settlement, variations in fuel costs, and furnace efficiencies.

SOURCE - Percentage of households using each form of energy from Census data. The handbook entitled "Estimating Energy Consumption for New Development" was used to determine the average space heating requirements. Heating degree days for each settlement were taken from the map entitled "Heating Degree Days" in Volume 2. More detailed calculation of the space heating costs can be found in Table 7.19.

TABLE 7.13 - TRANSPORTATION AND MUNICIPAL SERVICES ENERGY COST INDICES

TRANSPORTATION

1) School $/House - annual school bus fuel cost per household for each Township. Bus travel for separate school pickup has been excluded.

SOURCE - bus route maps as provided by School Boards. Fuel consumption rate as found in the Ministry of Energy handbook "Energy and Rural Land use Planning in Ontario".

2) Farm - Annual private transportation fuel cost for a typical farm household. Farm travel has been calculated on farm to service centre, family service/shopping, and recreation trips.

3) Non-farm - Annual private transportation fuel cost for a typical non-farm household. Non-farm travel has been calculated on work, family service/shopping, and recreation trips.

SOURCE - Farm and non-farm travel patterns are as found in the Ministry of Energy handbook "Energy and Rural Land use Planning in Ontario". Actual distances traveled from non-farm to work are based on 1971 and 1976 Statistics Canada data on place of work and County employment figures.

ROADS

1) KM - kilometres of roads maintained by the municipality

2) Ave L - average number of litres used by the municipality for road maintenance based on the years 81-82-83

3) $/KM - annual cost of fuel for road maintenance, per kilometre

Data received for this section has been incomplete and no meaningful relationships can be established. The data presented does not consider machinery rentals or fuel consumed by these rentals.

SOURCE - data prepared by municipal road departments.

SANITARY SEWERAGE

1) $ - annual energy cost to operate each municipal sewage system. Private sewage systems are primarily gravity fed septic tank systems, with zero energy cost to operate.

2) $/Pop - annual per capita cost to operate each system

SOURCE - Annual energy costs were provided from the operators of each system.

WATER SUPPLY

1) $ - annual energy cost to operate each municipal water supply and distribution system. No attempt has been made to determine the annual energy cost for individual private wells.

2) $/Pop - annual per capita energy cost for water supply.

SOURCE - Annual energy costs were provided from the operators of each system.

SOLID WASTE

1) Service Pop - the population which is serviced by the solid waste site.

2) $ - annual energy cost to operate the site

3) $/Pop - annual per capita cost to operate the site.

The data required to complete this section of the table is unavailable at the present time. The annual cost per capita for operation of the sites are assumed to be relatively small compared to the overall municipal services costs.

SOURCE - service population figures supplied by the Ministry of the Environment.

STREET LIGHTING

SOURCE - 1982 SIC/SRC Sector Report by Ontario Hydro.

7.4.2 TRANSPORTATION

Annual transportation costs per household have been developed for personal travel from farm and non-farm residential units and school bus operation. Planning measures which have been considered deal with reducing non-farm trips, farm to commercial trips, recreational trips and clustering of trip destinations.

Measures A1 and A2 discuss the difference in travel patterns for rural non-farm residential compared to similar non-farm units located in the existing built up areas. Non-farm units located in existing settlements have many trip destinations within the settlement area. This has the effect of reducing travel distances and thus fuel energy. Rural non-farm residential development use the automobile extensively for work, shopping and recreation. On the average, a rural non-farm residence uses $905 more energy than a similar residence located in an existing settlement. The cost difference is even greater for large well developed employment and commercial settlements. A residence in Goderich for example will spend $1,919 less on transportation than a non-farm residence in Grey Township. These figures are presented in Table 7.18 "Annual Transportation Costs per Unit". Further energy savings other than those proposed by A1 and A2, could be achieved through developing and improving commercial and employment services in existing settlements. Townships with high annual non-farm travel costs should be considered for such improvements.

By limiting development of non-farm residential to existing settlements, school bus costs could be maintained or reduced. Larger settlements usually have local educational facilities. No busing is required in this case. Bus travel should be limited to existing non-farm units and no increase in fuel consumption should be realized.

Planning measure A7 affects personal farm transportation. This measure deals with establishing and maintaining agricultural service settlements. Farm residents do not travel to work but do travel to agriculturally related commercial centres. Farm travel to these centres range from an estimated 8,000 to 24,000 kilometres or $545 to $1,635 per year for each farm unit.

Farm service centres in the County are fairly centrally located at this time. Small farm centres exist for each Township, but may be bypassed by local farm residents due to the provision of a limited range of services. Improvement of the smaller farm service centres to supply a wider range of services will decrease travel distances. This measure should be investigated for the Township in Table 7.15 with large farm to commercial travel distances.

Measure B14 provides for recreational areas to be located in or near each settlement to reduce recreational travel distances. Farm and non-farm residential units are assumed to make 2 trips per week or 104 trips per year. Farm and rural non-farm residents have to travel the same distance to recreational facilities. These residents must travel to the nearest settlements providing the recreational activity required. The estimates presented in Table 7.16 and 7.17, are based upon an assumed travel distance to a major settlement or recreational area.

Improvements in recreational travel distances proposed by this measure are most likely to occur in high travel Townships, towns and villages. Recreational travel in the area of Goderich is low whereas in East Wawanosh, Grey and Morris is high. As a result, Goderich Township residents pay an average $141 and Grey Township residents pay $368 annually for recreational transportation.

Planning Measures B1, B3, B4, B5 and B6 deal with clustering and/or concentrating commercial and employment; and providing local convenience commercial. Trips to commercial and employment areas by automobile will be reduced. The average urban non-farm residence uses $141 annually on shopping trips and $28 for in-area employment travel. The expected result is to reduce trip lengths and multiple trips. This aspect is indicated in Measure B4 as one-stop shopping.

Non-Planning Measures relating to transportation are A6, B1, B3 and C5.

Measure A6 has not been studied in detail but by investigating employment and commercial activity, travel patterns have been established. At this time, public transit development is not warranted.

Measures B3 and B4 are alternate methods of transit which may be applied to the County. The average urban non-farm residence located in a major settlement spends $137 annually on travel to employment within the settlement.

Out-of-area commuter travel to employment consumes a large amount of energy per capita. The per capita cost in the settlement of Wingham for commuter travel has been estimated at $3,290 annually. Wingham has the largest average distance travelled by commuters to employment. 220 people travel an average of 93 kilometres one way per working day from Wingham. 250 people in Grey Township commute an average of 31 kilometres one way per working day. Grey Township per capita cost for commuting to work is estimated at $1,100 annually. These costs are based upon Table 7.16 - Non Farm One Way Work Trips. Ride sharing for commuters as presented in Non-Planning Measure B3 can lead to significant overall energy savings. Assuming promotion of ride sharing decreases the number of vehicles by half, the Wingham energy cost per commuter could be reduced by $1,645 annually.

Conversion of gasoline engines to alternate fuels is discussed as Non-Planning Measure C5. Conversion of automobile fuels to propane is likely to produce the greatest cost savings. According to the Energy, Mines and Resources Enersave booklet, titled "Saving Energy in the Vehicle Fleet", a propane powered car engine is equivalent to a gasoline engine in terms of fuel consumption. Conversion of automobiles to propane fuel can have energy cost savings of $316 to $966 annually per capita for rural non-farm units. Conversion costs should range from $1200 to $2000 per vehicle. The public should be made aware of the federal government's National Energy Program. Incentives of up to $400 per vehicle conversion of commercial, agricultural and municipal fleets to propane are available. Conversion of all school buses to propane can have an annual fuel cost saving to each township of from $6727 to $17,902.

Conversion of large trucks to propane is not recommended. Trucks have heavy payloads and propane engines are not capable of meeting the power requirements. Conversion from gasoline engines to diesel fuel has a 20 to 40% energy cost saving.

There are many fuel saving measures for reducing vehicle fuel consumption. It is left to the individual to review and implement these widely available common sense measures.

PERSONAL TRANSPORTATION CALCULATION OF DATA

Annual private transportation costs for typical farm and non-farm residences have been calculated. Urban non-farm residences are assumed to be located in one of the ten larger settlements, while the Township non-farm units are located in scattered development with no commercial or support services.

The assumptions are taken from "Energy and Rural Land Use Planning in Ontario" handbook published by the Ontario Ministry of Energy. In addition, employment, commercial and recreational centres, as indicated through the energy study, are used as a basis for identifying travel patterns.

Huron is typical of an Agricultural Baseline Model with the addition of hamlets and clustered rural non-farm development. Travel patterns are based on the above model, test A3 of the handbook.

Test A3 Hamlet and Clustered Non-Farm Development

TRAVEL PATTERNS	TEST 3A HAMLET & CLUSTERED NON-FARM DEVELOPMENT
Farm to commercial centres	2 return trips per working day
Non-farm to Place of Work	1 return trip per working day
Family Service Shopping	1 return trip every 2 days
Recreation	2 return trips per week
Education	1 return trip per school day

(a) EDUCATION COSTS

Education travel patterns are not included in the farm and non-farm transportation costs. These have been replaced by a separate cost for school bus operation.

Education transportation costs can only be reasonably assessed for each Township based on bus route information. The ten larger settlements in Huron cannot be assessed for education transportation costs due to limited information.

The method of calculating the school transportation cost consisted of:

a) determine the bus route length for each Township in kilometres.

b) determine the number of litres used based on an assumed consumption of 1.8 kilometres per litre.

c) calculate the total cost of gasoline for each Township. 26 buses out of 155 use a fuel other than gasoline. Gasoline has been assumed to simplify calculations.

d) calculate the cost per household for each Township.

The interim calculations are presented on Table 7.14 - School Bus Costs.

(b) FARM TO COMMERCIAL

Farm units create trips for shopping and recreation as do non-farm units. Farm units do not create trips to work but do create farm to commercial or service centre trips. Farm trips have been considered for each Township.

Farm travel distances are based on the average distance between the farm and the destination which provides the service required. This would normally be a commercial town or agricultural service centre. The estimated one-way travel distances in kilometres are presented on Table 7.15 - Personal Farm Transportation.

(c) NON-FARM TO PLACE OF WORK

The estimated distance travelled by non-farm units of work has been calculated for each of the ten large settlements numbered 1 to 10, and for each Township numbered 11 to 26 inclusive.

Employment information for Huron County has been investigated. 1971 and 1976 Place of Work data supplied by the County from Statistics Canada has been used to determine the average distance travelled. These statistics provide information on the number of employees:

a) living and working in the area
b) working at home
c) working outside the area

The area referred to above means the Township or one of the ten major settlements.

The people living and working in the area include those working at home. To determine non-farm travel these people working at home are excluded. The average internal travel distances for the area have been estimated and included in the calculations. Some internal travel distances are insignificant when compared to the out of area work trips.

The people who work outside the area are commuters. The distance travelled by these commuters are tabulated in the statistics. A weighted average of these distances has been calculated for each area.

The final estimated distance travelled, for each area to work, is based on a weighted average of people working in the area and the people working outside the area. The estimated work travel distances are presented on Table 7.16 "Non-Farm One Way Work Trips".

The estimated work, shopping and recreational non-farm travel distances are presented on Table 7.17 "Personal Non-Farm Transportation".

(c) FARM AND NON-FARM TO SHOPPING AND RECREATION

Estimates of travel distances to service/shopping and recreation have been completed for each major settlement and Township. These figures are shown on the distance Tables 7.15 and 7.17.

The total annual farm and non-farm travel distances and costs have been calculated and are shown on Table 7.15. Costs are based on an assumed vehicle fuel consumption of 7 Km/litre for gasoline fueled North American style vehicles.

HURON COUNTY ENERGY CONSERVATION STUDY

TABLE 7.14 SCHOOL BUS COSTS ANNUALLY
ONE WAY TRAVEL DISTANCES

		PUBLIC SCHOOL	HIGH SCHOOL	COLLEGE INSTITUTE	MENTALLY RETARDED	TOTAL DAILY KM	ANNUAL COST
HURON COUNTY							
11	ASHFIELD	250	164	106		520	28938
12	COLBORNE	158		96		254	14135
13	EAST WAWANOSH	184	180	26	16	406	22594
14	GODERICH	258	110	94		462	25710
15	GREY	364	38		86	488	27157
16	HAY	228	242		36	505	28159
17	HOWICK	390	148		32	570	31720
18	HULLETT	276	232	28		536	29828
19	McKILLOP	12	312			324	18031
20	MORRIS	258	228		64	550	30608
21	STANLEY	206	212			418	23262
22	STEPHEN	268	350		58	676	37619
23	TUCKERSMITH	248	248			496	27602
24	TURNBERRY	200	210		84	494	27491
25	USBORNE		280		38	318	17697
26	WEST WAWANOSH	174	132	84	20	410	22816
TOTAL		3474	3086	434	434	7428	413368

NUMBER OF SCHOOL DAYS ESTIMATED TO BE 42 WEEKS X 5 DAYS = 210 DAYS
FUEL CONSUMPTION ESTIMATED TO BE 1.8 KM PER LITRE

HURON COUNTY ENERGY CONSERVATION STUDY

TABLE 7.15 PERSONAL FARM TRANSPORTATION
KM TRAVELLED PER UNIT PER TRIP ONE WAY

HURON COUNTY		FARM TO COMMERCIAL	FARM TO SHOPPING	FARM TO RECREATION	ANNUAL FARM TRAVEL DISTANCE
11	ASHFIELD	14	14	21	23968
12	COLBORNE	10	10	10	16080
13	EAST WAWANOSH	16	16	24	27412
14	GODERICH	10	10	10	16080
15	GREY	23	23	26	37608
16	HAY	13	13	13	20904
17	HOWICK	23	23	23	36984
18	HULLETT	11	11	11	17688
19	McKILLOP	10	10	10	16080
20	MORRIS	14	14	24	24592
21	STANLEY	18	18	18	28944
22	STEPHEN	14	14	14	22512
23	TUCKERSMITH	10	10	14	16912
24	TURNBERRY	8	8	8	12864
25	USBORNE	10	10	10	16080
26	WEST WAWANOSH	16	16	21	26768

TWO COMMERCIAL TRIPS PER WORKING DAY

WORKING DAYS ASSUMED TO BE 52 X 5 = 260 DAYS

SHOPPING - 1 TRIP EVERY 2 DAYS, ASSUME 180 TRIPS PER YEAR

RECREATION - 2 TRIPS PER WEEK, ASSUME 104 TRIPS PER YEAR

HURON COUNTY ENERGY CONSERVATION STUDY

TABLE 7.16 NON-FARM ONE WAY WORK TRIPS

		WORKING IN AREA		WORKING OUTSIDE		AVERAGE DISTANCE TRAVELLED TO WORK (KILOMETRES)
		# PEOPLE	DISTANCE	# PEOPLE	DISTANCE	
HURON COUNTY						
1	BAYFIELD	65	1.0	95	22	13
2	BLYTH	125	.60	105	21	10
3	BRUSSELS	155	.60	45	35	8
4	CLINTON	755	1.0	280	34	10
5	EXETER	760	1.0	410	29	11
6	GODERICH	2125	1.5	185	63	6
7	HENSALL	205	.60	50	43	9
8	SEAFORTH	580	.60	110	29	5
9	WINGHAM	880	.60	220	93	19
10	ZURICH	155	.50	105	19	8
11	ASHFIELD	15		270	20	20
12	COLBORNE	5		315	8	8
13	EAST WAWANOSH			195	25	25
14	GODERICH	90	10.	515	16	15
15	GREY	60		250	31	31
16	HAY	15		405	14	14
17	HOWICK	300	11.	220	20	15
18	HULLETT	60		170	22	22
19	McKILLOP	5		135	20	20
20	MORRIS	30		355	11	11
21	STANLEY	15		350	13	13
22	STEPHEN	660	14.	560	22	18
23	TUCKERSMITH	25		655	13	13
24	TURNBERRY	30		275	10	10
25	USBORNE	15		345	27	27
26	WEST WAWANOSH	15		260	27	27

HURON COUNTY ENERGY CONSERVATION STUDY

TABLE 7.17 PERSONAL NON-FARM TRANSPORTATION KM TRAVELLED PER UNIT PER TRIP ONE WAY

		1 NON FARM TO WORK	2 NON FARM TO SHOPPING	3 NON FARM TO RECREATION	4 ANNUAL NON FARM TRAVEL DISTANCE
HURON COUNTY					
1	BAYFIELD	1.0	7	9	4984
2	BLYTH	.6	5	9	4056
3	BRUSSELS	.6	7	11	5208
4	CLINTON	1.0	4	6	3256
5	EXETER	1.0	5	9	4344
6	GODERICH	1.5	1.5	1.5	1644
7	HENSALL	.6	7	11	5208
8	SEAFORTH	.6	5	9	4344
9	WINGHAM	.6	7	11	5208
10	ZURICH	.5	9	11	5876
11	ASHFIELD	20	14	21	19808
12	COLBORNE	8	10	10	9840
13	EAST WAWANOSH	25	16	24	23752
14	GODERICH	15	10	10	13480
15	GREY	31	23	26	29808
16	HAY	14	13	13	14664
17	HOWICK	15	23	23	20864
18	HULLETT	22	11	11	17688
19	McKILLOP	20	10	10	16080
20	MORRIS	11	14	24	15752
21	STANLEY	13	18	18	16984
22	STEPHEN	18	14	14	17312
23	TUCKERSMITH	13	10	14	13272
24	TURNBERRY	10	8	8	9744
25	USBORNE	27	10	10	19720
26	WEST WAWANOSH	27	16	21	24168

ONE WORK TRIP PER WORKING DAY

WORKING DAYS ASSUMED TO BE 52 X 5 = 260 DAYS

SHOPPING - 1 TRIP EVERY 2 DAYS, ASSUME 180 TRIPS PER YEAR

RECREATION - 2 TRIPS PER WEEK, ASSUME 104 TRIPS PER YEAR

HURON COUNTY ENERGY CONSERVATION STUDY

TABLE 7.18 ANNUAL TRANSPORTATION COST PER UNIT

		ANNUAL NON FARM TRAVEL DISTANCE	ANNUAL NON FARM COST	ANNUAL FARM TRAVEL DISTANCE	ANNUAL FARM COST
1	BAYFIELD	4984	340		
2	BLYTH	4056	276		
3	BRUSSELS	5208	355		
4	CLINTON	3256	222		
5	EXETER	4344	296		
6	GODERICH	1644	112		
7	HENSALL	5208	355		
8	SEAFORTH	4344	296		
9	WINGHAM	5208	355		
10	ZURICH	5876	400		
11	ASHFIELD	19808	1350	23968	1633
12	COLBORNE	9840	671	16080	1096
13	EAST WAWANOSH	23752	1619	27412	1868
14	GODERICH	13480	919	16080	1096
15	GREY	29808	2031	37608	2563
16	HAY	14664	999	20904	1424
17	HOWICK	20864	1422	36984	2520
18	HULLETT	17688	1205	17688	1205
19	McKILLOP	16080	1096	16080	1096
20	MORRIS	15752	1073	24592	1676
21	STANLEY	16984	1157	28944	1972
22	STEPHEN	17312	1180	22512	1534
23	TUCKERSMITH	13272	904	16912	1152
24	TURNBERRY	9744	664	12864	877
25	USBORNE	19720	1344	16080	1096
26	WEST WAWANOSH	24168	1647	26768	1824

DISTANCES TAKEN FROM TABLES 7.15 AND 7.17

FUEL CONSUMPTION ESTIMATED AT 7.0 KM PER LITRE

7.4.3 SPACE HEATING

Residential space heating has been investigated based upon a typical single family residence throughout Huron County. Measures presented in section 8.0 of Volume 2 deal with density of development, thermal efficiencies, fuel use, conversion to alternative fuels and outreach.

Density of development is discussed in planning measures B1, B2 and C4. These measures state higher densities, intensity and clustering of development will reduce space heating requirements.

The investigation did not consider the effect of density on space heating requirements. These measures can be considered by estimating the energy saving effect and relating this to the cost Table 7.12 for the specific settlement. A 20% saving for an oil heated home in Goderich, based upon density, would result in an annual $310 saving. The effect of density on fuel consumption is site specific and would have to be determined for each settlement.

The space heating costs in Table 7.12 are based upon a single family detached home. Space heating costs for all other types of residential units can be calculated using the base single family detached unit. Using the energy relations stated in Measure B2 "Increasing Residential Densities" for a residential unit in Goderich, heated by oil, will have the following annual costs for various housing units:

SINGLE FAMILY DETACHED	$1,552
SEMI-DETACHED	$1,397
TOWN HOUSE	$1,164
UNIT IN APARTMENT BUILDING	$ 776

Increasing thermal efficiencies are presented in Planning Measure B7 and Non-Planning Measures C3 and C4. These measures relate to new and existing buildings.

Upgrading thermal standards for new construction is a practical and common practice in today's energy conscious market.

Improving thermal efficiencies of existing buildings presents the largest area for residential energy savings in Huron. Non-Planning Measure C3 states an estimated heating cost saving of up to 25% annually can be obtained through thermal upgrading in existing homes. Based upon this saving, a typical detached home in Goderich, heated with oil, could save up to $388 by improving the thermal efficiency of the unit.

According to 1981 Census data, Huron County had 18,880 occupied private dwellings. 10,635 of these dwellings or 56% were constructed before the year 1946. 69% of all dwellings were constructed before 1960. Improvement of thermal efficiencies in these dwelling units will greatly reduce the overall energy consumed for residential space heating. Home owners should be made aware of the $500 home insulating grant program. Special attention should be placed on townships with the greatest percentage of pre-1946 housing. For example, the Townships of East Wawanosh and West Wawanosh both have 75% of the dwellings built before the year 1946. In addition, these Townships do not have access to less expensive natural gas, and as a result the savings will be representatively higher.

Fuel use and conversion to alternate fuels are related to Non-Planning Measures A1 and C5 as discussed in Section 8.0. Measure A1 is the development of alternate fuel infrastructure. The alternate fuels considered for infrastructure development are natural gas and electricity.

Natural gas is the cheapest form of space heating fuel and is approximately $390 less than electricity annually. This is based upon values presented on Table 7.12 "Energy Price and Space Heating Cost Indices".

Conversion to natural gas should be attempted wherever the fuel is available. Special attention should be paid to settlements with high oil users such as residential units in Hensall. Table 7.12 indicates that 60% of the units use oil heating systems and only 17% use natural gas. A $402 saving annually in energy cost per unit, for space heating, could be realized in Hensall.

Extension of natural gas service should be promoted in Huron County. Service should be provided, if economically viable, to the larger settlements which would result in the greatest number of potential users.

Electricity is the second least expensive space heating fuel after natural gas. Electric heating is approximately $40 less expensive than oil heating annually. The actual difference in annual energy cost is dependent on the cost of electricity for the settlement considered. For example, the cost for electricity in Bayfield is 4.2 cents per kilowatt hour as compared to 4.7 cents in Blyth. The high cost of electricity in Blyth actually makes the use of oil for space heating less expensive than electricity. As a result, only 18% of the residential units are heated by electricity and 73% are heated by oil fired furnaces.

Cases such as Blyth reflect the need to examine the pricing of electricity so as to make the conversion from oil more attractive. Conversion from oil to electricity may be the only reasonable choice if natural gas is not available. Conversion from oil will not take place if fuel savings are not significant.

Propane is not extensively used for residential space heating. This is due to the high annual cost of using propane as shown on Table 7.12. Propane produces less heat per litre than natural gas and as a result more litres are required to produce the same amount of heat. Propane is not seen as an economical alternate fuel source for space heating.

Conversion from oil to alternate forms of energy requires the replacement of the oil furnace. Home owners should be made aware of the new types of high efficiency furnaces for natural gas or oil fuel and the available $800 oil grant. Conventional furnaces are 60% efficient and high efficiency oil furnaces are 90%. A high efficiency oil furnace in Goderich will use $517 less fuel annually compared to a conventional furnace.

The Ministry of Municipal Affairs and Housing has completed testing of new furnaces under actual residential situations. The conversion from oil to gas has been studied by this Ministry and the results are presented below:

CONVERSION COST AND PAYBACKS

FROM	TO	COST $	PAYBACK IN YEARS
Oil	High Efficiency Gas	3000	4.5
Oil	Conventional Gas	1700	3.2
Gas	High Efficiency Gas	3000	9

Cost figures consider the $800 oil grant and the reduction due to tax applied to the grants. Cost figures indicate the average expected total cost to convert the furnace system.

Conversion of space heating systems are more likely to occur in older residential units where the furnace needs replacing or major repairs. Possible candidates for conversion are the residential units constructed before 1960. These houses represent 69% of the residential development in Huron County. Furnaces in these units will be approximately 20 years old and may need replacing.

Natural gas is not available in all parts of Huron County. Conversion of conventional oil furnaces to electricity or high efficiency oil units are possible alternatives to natural gas. Depending on the present oil furnace a conversion to a high efficiency unit can result in a fuel saving of up to 52%. This information has been developed for actual working furnaces by the Ministry of Municipal Affairs and Housing.

The conversion from oil may not be economical for some residential dwellings. The present space heating system may not need replacement. In such cases an updating of the system may be all that is required. This may consist of upgrading the fuel burner or valves or simply tuning up the furnace so it runs more efficiently. A tune-up may increase efficiency by up to 30%. Turning down the thermostat at night by 5 degrees C (9 degrees F) results in a 14% annual saving.

CALCULATION OF DATA

Annual space heating costs, as presented in Table 7.12 "Energy Price and Space Heating Cost Indices" include the effect of:

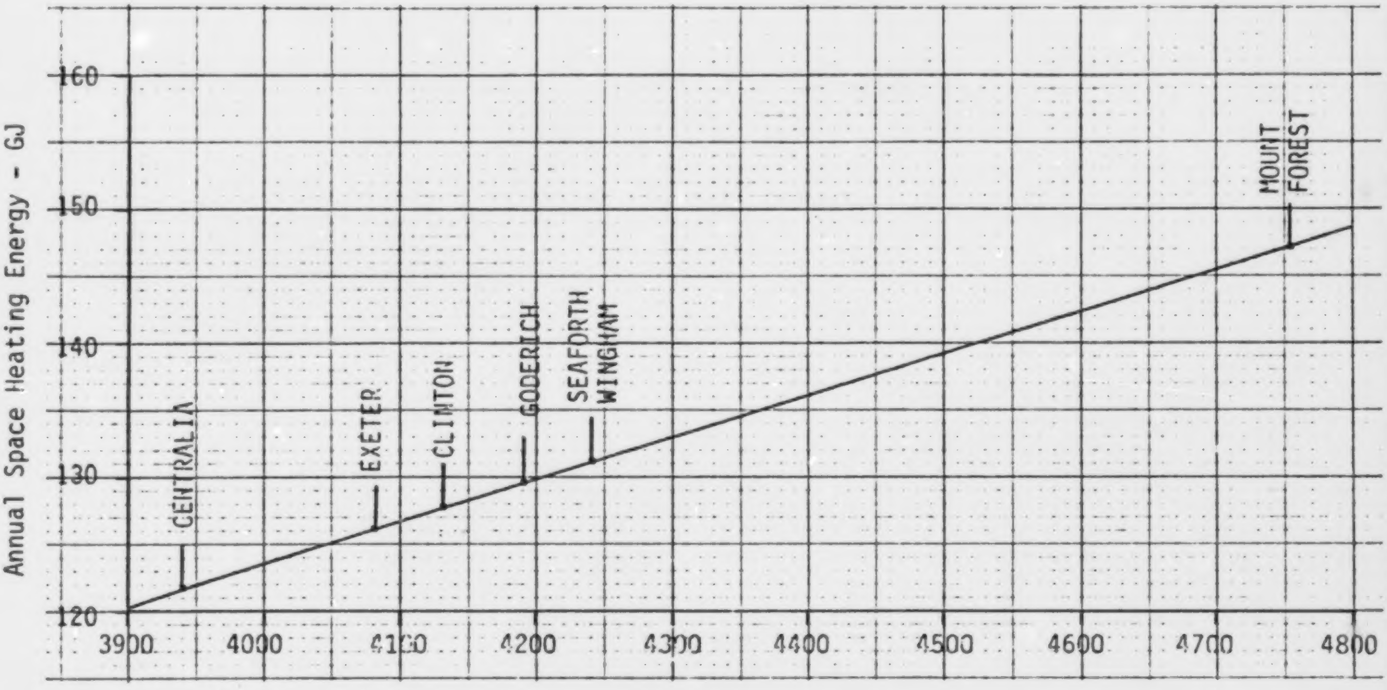
a) geographic location as represented by the heating degree day factor.
b) variation of fuel costs throughout the County.
c) variation in furnace efficiencies.

A 97 square metre bungalow was selected as the standard residential unit to be used throughout Huron County. The standard was assumed to require 130 GJ of energy for space heating annually, on average. This is the regular unit found in the energy handbook entitled "Estimating Energy Consumption for New Development" (EECND). See Figure 7.1.

Heating degree days are an indication of the severity of the winter weather. Degree days units are counted whenever the daily mean temperature falls below 18 degrees C (65 degrees F). Heating degree days increase as you proceed northward. Toronto for example, has a five year average of 3,359 degree days whereas Wingham has 4,240.

FIGURE 7.1:

ANNUAL SPACE HEATING ENERGY CONSUMPTION IN BILLION JOULES (GJ)
FOR STANDARD 97 SQUARE METRE BUNGALOW IN HURON COUNTY
VS HEATING DEGREE DAYS



Heating Degree Days - ^{o}C

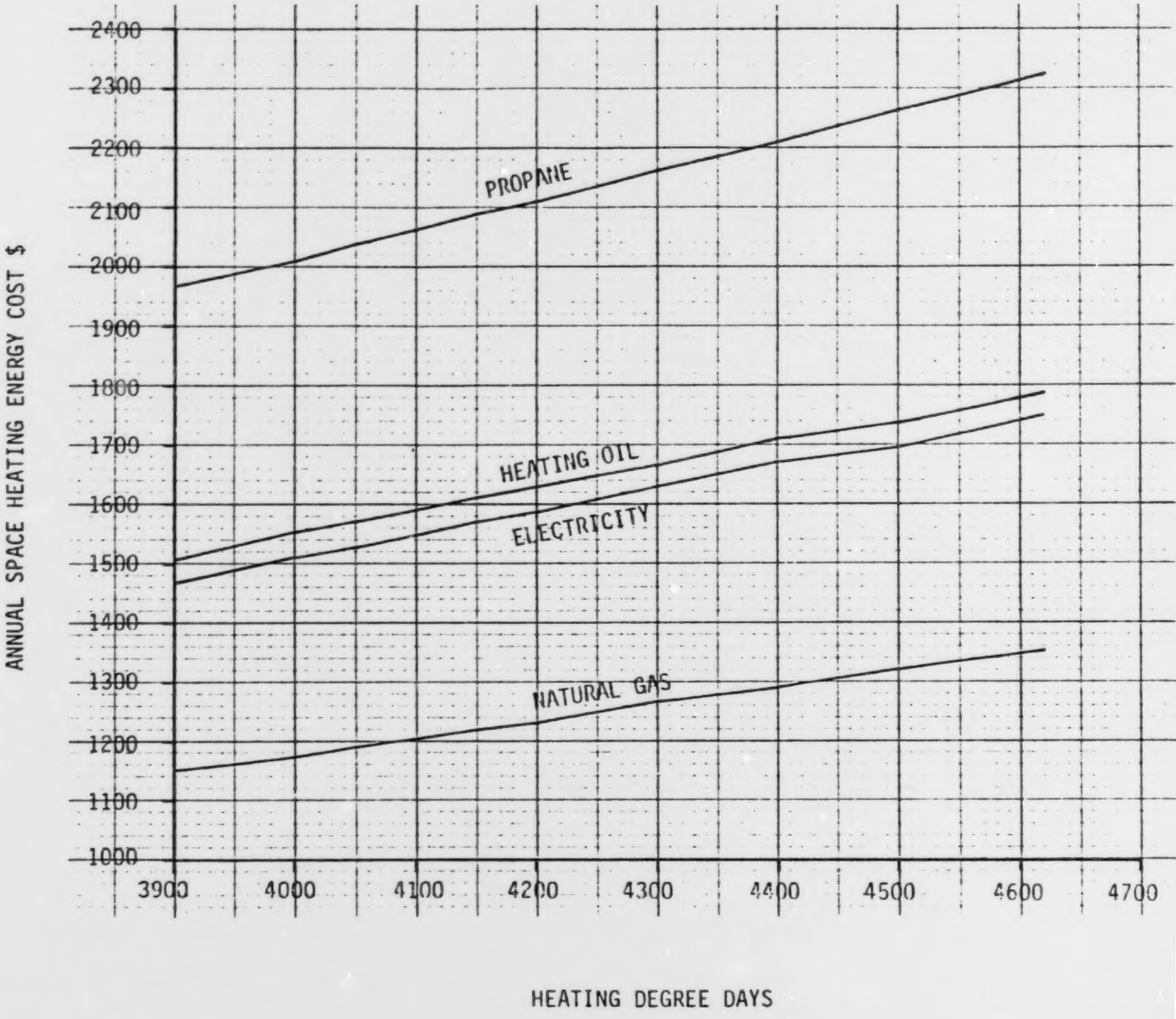
Energy= 30.94 x Heating Degree Days

Source: "Estimating Energy Consumption for New Development"
- Ministry of Energy, July 1982

The heating degree days, for each settlement, have been calculated from Table A1 in the handbook "Estimating Energy Consumption for New Development". (EECND)

The annual energy required is increased to account for the furnace efficiencies as stated in Table B4 from the EECND handbook. Regular efficiencies have been assumed. The new actual energy required is then used to calculate the annual cost based on the fuel type and price in the settlement. These final annual costs have been transferred from Table 7.12 to Table 7.19. A graphical display of the price variation by fuel based on heating degree days is shown on Figure 7.2.

FIGURE 7.2:



Energy Cost = GJ / Eff x Price

TABLE 7.19

HURON COUNTY ENERGY CONSERVATION STUDY
- ANNUAL SPACE HEATING COST TABLE BASED ON HEATING DEGREE DAYS

CALCULATES ANNUAL SPACE HEATING COST USING HEATING DEGREE DAYS AND FURNACE EFFICIENCY

		HEATING DEGREE DAYS °C	ENERGY REQUIRED GJ	ELECTRICITY			NATURAL GAS			PROPANE			HEATING OIL		
				KWH	$/KWH	ANNUAL COST $	ACTUAL GJ	CUBIC METER	ANNUAL COST $	ACTUAL GJ	LITRES	ANNUAL COST $	ACTUAL GJ	LITRES	ANNUAL COST $
HURON COUNTY															
1	BAYFIELD	3950	122.213	33948	.042	1426	203.68	5459	1161	203.68	7956	1989	203.68	4881	1533
2	BLYTH	4430	137.064	38073	.047	1789	228.44	6122	1302	228.44	8923	2231	228.44	5475	1719
3	BRUSSELS	4600	142.324	39534	.044	1740	237.20	6357	1352	237.20	9266	2316	237.20	5685	1785
4	CLINTON	4170	129.020	35839	.044	1577	215.03	5763	1226	215.03	8400	2100	215.03	5153	1618
5	EXETER	4200	129.948	36096	.044	1588	216.58	5804	1234	216.58	8460	2115	216.58	5190	1630
6	GODERICH	4000	123.760	34378	.044	1513	206.26	5529	1176	206.26	8057	2014	206.26	4943	1552
7	HENSALL	4270	132.114	36698	.045	1651	220.19	5901	1255	220.19	8601	2150	220.19	5277	1657
8	SEAFORTH	4450	137.683	38245	.046	1759	229.47	6150	1308	229.47	8964	2241	229.47	5499	1727
9	WINGHAM	4450	137.683	38245	.044	1683	229.47	6150	1308	229.47	8964	2241	229.47	5499	1727
10	ZURICH	4030	124.688	34636	.045	1558	207.81	5569	1184	207.81	8118	2029	207.81	4980	1564
11	ASHFIELD	4100	126.854	35237	.043	1515	211.42	5666	1205	211.42	8259	2065	211.42	5067	1591
11.1	AMBERLY				.043										
11.2	BELFAST				.043										
11.3	DUNGANNON				.043										
11.4	KINGSBRIDGE				.043										
11.5	KINTAIL				.043										
11.6	LOCHALSH				.043										
11.7	PORT ALBERT				.043										
12	COLBORNE	4150	128.401	35667	.044	1569	214.00	5735	1220	214.00	8359	2090	214.00	5129	1610
12.1	BENMILLER				.044										
12.2	CARLOW				.044										
12.3	NILE				.044										
12.4	SALTFORD				.044										
13	EAST WAWANOSH	4400	136.136	37815	.044	1664	226.89	6081	1293	226.89	8863	2216	226.89	5438	1707
13.1	BELGRAVE				.044										
13.2	WHITECHURCH				.044										
14	GODERICH	4050	125.307	34807	.044	1532	208.84	5597	1190	208.84	8158	2040	208.84	5005	1572
14.1	HOLMESVILLE				.044										
15	GREY	4650	143.871	39964	.045	1798	239.78	6426	1367	239.78	9367	2342	239.78	5746	1804
15.1	CRANBROOK				.045										
15.2	ETHEL				.045										
15.3	MOLESWORTH				.045										
16	HAY	4050	125.307	34807	.045	1566	208.84	5597	1190	208.84	8158	2040	208.84	5005	1572
16.1	BLAKE				.045										
16.2	KIPPEN				.045										
17	HOWICK	4620	142.943	39706	.044	1747	238.23	6385	1358	238.23	9306	2326	238.23	5709	1793
17.1	FORDWICH	4650	143.871	39964	.044	1758	239.78	6426	1367	239.78	9367	2342	239.78	5746	1804
17.2	GORRIE	4600	142.324	39534	.044	1740	237.20	6357	1352	237.20	9266	2316	237.20	5685	1785
17.3	LAKELET				.044										
17.4	WROXETER	4580	141.705	39362	.044	1732	236.17	6329	1346	236.17	9226	2306	236.17	5660	1777
18	HULLETT	4370	135.208	37558	.045	1690	225.34	6039	1284	225.34	8802	2201	225.34	5400	1696
18.1	CONSTANCE				.045										
18.2	LONDESBOROUGH				.045										
19	McKILLOP	4550	140.777	39105	.045	1760	234.62	6288	1337	234.62	9165	2291	234.62	5623	1766
19.1	WALTON				.045										
19.2	WINTHROP				.045										
20	MORRIS	4520	139.849	38847	.044	1709	233.08	6246	1328	233.08	9105	2276	233.08	5586	1754
20.1	BLUEVALE				.044										
20.2	JAMESTOWN				.044										
20.3	JUNCTIONVILLE				.044										
21	STANLEY	4050	125.307	34807	.044	1532	208.84	5597	1190	208.84	8158	2040	208.84	5005	1572
21.1	VARNA				.044										
22	STEPHEN	4000	123.760	34378	.044	1513	206.26	5528	1176	206.26	8057	2014	206.26	4943	1552
22.1	CENTRALIA				.044										
22.2	CREDITON				.044										
22.3	CORBETT				.044										
22.4	DASHWOOD				.044										
22.5	GREENWAY				.044										
22.6	HURON PARK	4070	125.926	34979.	.044	1539	209.87	5625	1196	209.87	8198	2050	209.87	5030	1579
22.7	MOUNT CARMEL				.044										
22.8	SHIPKA				.044										
23	TUCKERSMITH	4300	133.042	36956	.046	1700	221.73	5942	1264	221.73	8662	2165	221.73	5314	1668
23.1	BRUCEFIELD				.046										
23.2	EGMONDVILLE				.046										
23.3	HARPURHEY				.046										
23.4	VANASTRA	4180	129.329	35925	.046	1652	215.54	5777	1229	215.54	8420	2105	215.54	5166	1622
24	TURNBERRY	4500	139.230	38675	.044	1702	232.05	6219	1323	232.05	9064	2266	232.05	5561	1746
24.1	BELMORE				.044										
25	USBORNE	4250	131.495	36526	.044	1607	219.15	5873	1249	219.15	8561	2140	219.15	5252	1649
25.1	ELIMVILLE				.044										
25.2	KIRKTON				.044										
25.3	WINCHESEA				.044										
25.4	WOODHAM				.044										
26	WEST WAWANOSH	4250	131.495	36526	.045	1644	219.15	5873	1249	219.15	8561	2140	219.15	5252	1649
26.1	AUBURN				.045										
26.2	ST.HELENS				.045										

7.4.4 PHYSICAL SERVICES

Physical services measures from Section 8.0 of Volume 2 include utilization of existing services and municipal operations management.

Utilization of existing services is discussed in Planning Measures A2, A3, B6 and B7. These measures deal with locating new development and the re-use of existing structures to settlements which have existing space capacity to service the development.

Spare capacity relates to the existing water supply and sewage treatment facilities. Spare capacity for these municipal systems has been requested from the Ministry of the Environment. This information will complete Table 7.11 - Existing Municipal Data. The existing municipal data will provide an indication as to where infilling and new development should occur.

The expected energy cost savings result from increased development in settlements where no expansion of existing facilities will be required. A decrease in the cost for operating the systems per capita should be realize, or in effect making the facilities more efficient.

Spare capacity may exist for water supply systems while the sanitary sewerage facilities are limited. Development may occur by having municipal water service and private sewage systems. Investigation of soil suitability should be determined toavoid fill being required or the need to pump the sewage.

Municipal operations are described in Non-Planning Measures B1. Much of the required municipal information is incomplete or unavailable at the present time. It is suggested that further study is needed so this information can be obtained and assessed. The Municipal data received has been entered on Table 7.13.

Limited information has been received for municipal water supply operational costs. Annual operational costs per capita range from 45 cents for Exeter to $20 dollars for Vanestra. Obviously, the Vanestra system should be reviewed.

Updating the Vanestra system to an average operational cost of $2.80 per capita would save $9,460 per year. The operational cost would be reduced to $1,540 per year from the present $11,000. A corresponding reduction in the operational costs for the Clinton system would be realized.

Private water systems have not been examined in this study. Actual field testing of energy consumed by a private residence for an individual well should be undertaken. Private well and municipal water systems could then be compared.

The sewage treatment information received indicates that lagoon type treatment plants are less expensive to operate than mechanical systems. The annual cost per capita for operation of lagoon systems range from 88 cents to $1.90 while mechanical plant costs range from $3.28 to $17.27. New sewage treatment plant should be lagoon type based upon operational cost only, no consideration is taken of the differences in construction costs.

The settlement of Vanestra has a very high per capita sewage treatment cost. Further study and updating of this system is recommended. Updating the water supply system may be sufficient to reduce the sewerage flow and thus reduce the operational costs of the sewage treatment plant.

Solid waste information on operational costs are unavailable. Recycling of materials may become economical once alternate materials are allowed to be used for beverage cans. At present, only steel cans are used. Alternate materials such as aluminum make recycling economical.

Street lighting in the major settlements of Huron County cost $163,500 annually. Street lighting in Goderich costs $50,000 annually. Incandescent lighting is the last efficient followed by fluorescent; the most efficient is high pressure sodium.

Energy savings for conversion to high pressure sodium lighting are as follows:

FROM	TO	ENERGY SAVINGS
Incandescent	High Pressure Sodium	68 to 74%
Fluorescent	High Pressure Sodium	25 to 50%

These energy savings are taken from Table 2 of the Energy, Mines and Resources Enersave booklet titled "Saving Energy in Street Lighting".

8.0 PLANNING MEASURES AND NON-PLANNING MEASURES

8.1 A Generalized Listing

A planning measure is an action taken by the County of Huron or a local municipality through its jurisdiction under The Planning Act, 1983 or by the provincial government through provincial policy statements affecting physical development.

The planning measures are divided into 3 perspectives or structural levels:

A. County level
B. Settlement level (refers to municipality or to settlement within a municipality)
C. Site, building design, construction and operations level.

The planning measures are intended to achieve the energy conservation objectives for Huron County. Initially the listing of planning measures and their explanation, are adapted from current thinking in the energy conservation and planning field. The planning measures may in part be applicable in Huron County. In some instances non-planning measures may complement the planning measures.

The non-planning measures to achieve energy conservation are in part related to how planning is undertaken in Huron County. They may be particularly applicable to the Huron County.

The mode of achieving planning and non-planning measures pertains to the statutory authority of Huron County, the local municipalities and the provincial government. The listing does not, at this time, indicate the degree of achievability of the measures. The degree of achievability is limited in part by the statutory authority itself and in part by the policies, guidelines and by-laws which are in place at this time.

The acceptability of achieving these planning and non-planning measures in Huron County is the end result of this examination.

PLANNING AND NON-PLANNING MEASURES

PLANNING ELEMENT	PLANNING MEASURE	NON-PLANNING MEASURE	MODE OF ACHIEVEMENT	ENERGY CONSERVATION OBJECTIVE
A. COUNTY LEVEL	Discourage sporadic non-farm residential development Preserve prime agricultural land Utilize and maximize existing infrastructure Expand existing built-up areas, particularly on major roads Protect woodlots Locate processing and marketing areas close to source Establish and maintain agricultural service settlements Intensify seasonal settlements Optimize farm sizes Maintain large, contiguous agricultural areas	Telecommunications Develop natural gas and electricity infrastructure Develop local conventional energy resources Develop inter-community public transit (school buses) Co-generation Resource recovery (waste heat) Freight consolidation	Official plan Secondary plan Foodland Guideline Municipal By-laws Servicing Policies Woodlot management	Reduce person kilometres Reduce per tonne kilometres Accessibility to and availability of crop wastes, plant wastes, organics and wood waste. Availability of water for hydro-electric generation Municipal waste availability Access to more efficient energy sources for users.

PLANNING ELEMENT	PLANNING MEASURE	NON-PLANNING MEASURE	MODE OF ACHIEVEMENT	ENERGY CONSERVATION OBJECTIVE
B. SETTLEMENT LEVEL	Mixed-use Development - residential and employment areas - high density residential and commercial areas Re-use or conversion of existing buildings and redevelopment of lands Infilling of Buildings Concentrate commercial development in nodes and along corridors Provide localized seasonal recreational areas Allow home occupations Joint use of public facilities Increasing residential densities Higher intensities of commercial and industrial development Internal street system limits Walking paths Bicycle paths Provide local or neighbourhood convenience commercial Access to public transit	ride sharing personal transit municipal operations management - water supply - roads - sewage treatment - vehicles - solid waste local food production improved transportation of farm products from farm Traffic management speed parking traffic control	Official Plan Secondary Plan Zoning By-law Agricultural Code of Practice Site Plan Control Subdivision Plan Community Improvement Plan Municipal By-laws	Same as A plus Solar access Residential energy efficiency Commercial energy efficiency Farm energy efficiency

PLANNING ELEMENT	PLANNING MEASURE	NON-PLANNING MEASURE	MODE OF ACHIEVEMENT	ENERGY CONSERVATION OBJECTIVE
C. SITE, BUILDING DESIGN AND OPERATIONS LEVEL	Minimum property standards Clustering of buildings Orientation of lots, buildings and streets with respect to sun and wind Landscaping and buffering of houses and roads Solar access protection	Outreach Retrofit Conversion to other sources Improve efficiencies of heating systems Agricultural operational and design technology Improve thermal efficiencies of building envelope - insulation - air/vapour barrier - caulking - weatherstripping Upgrade thermal standards of new home construction (R2000)	Property Standards By-law Building code By-law Zoning By-law Federal and Provincial research grants and loans Communication and Education	Solar access Residential energy efficiency Commercial energy efficiency

8.2 Planning Measures: Description from conventional wisdom

A COUNTY LEVEL

A.1 DISCOURAGE SPORADIC NON-FARM RESIDENTIAL DEVELOPMENT

Individual non-farm houses on relatively small lots encourage the use of the automobile for work-related and shopping trips and school bus operations.

By discouraging or prohibitting the severances for non-farm residential lots, the person-trip kilometres for work-trips, shopping trips and school bus operations and per tonne kilometres for truck delivery trips will be reduced overall. This meets the objective of reducing petroleum consumed for transportation.

In Huron, there is an estimated 1900 dwelling units located throughout the County either individually or in small clusters of 5 or less units without any related commercial or institutional activities. This represents 12% of the existing non-farm dwellings in the County. If development is directed to the various existing settlements in this County then this percentage would decrease in the future although the total number of scattered dwellings would be similar.

A.2 EXPAND EXISTING BUILT-UP AREAS, PARTICULARLY ON MAJOR ROADS

The purpose is to concentrate new development in existing settlements which are located on provincial highways and the county roads. This would take advantage of existing infrastructure and would concentrate vehicular trip-making.

The smaller settlements are particularly sensitive to expansion since they require private water supply and sewage treatment and are located within the productive agricultural community.

The outward expansion of existing settlements is limited by the need to preserve agricultural land.

The larger settlements could be examined for expansion and may offer the opportunity for supporting commercial and industrial development.

A.3 UTILIZE AND MAXIMIZE EXISTING INFRASTRUCTURE

Additional development should be directed to settlements which have an existing usable infrastructure of roads, water supply and sewage treatment. The construction of these facilities entails the consumption of energy. Consistent with the use of existing facilities is the need to achieve efficiencies in energy consumption for operations. This efficiency combined with the higher intensity and density of development would reduce the per capita consumption of direct and indirect energy.

There are limits to the capacity of these facilities to cope with development however these limits may be extended by virtue of built-in operational efficiencies in the physical plant.

There may be opportunities to expand the capacity of existing private communal water and sewage treatment systems through efficient operations in 11 of the larger existing settlements.

There may be opportunities to locate major new facilities such as institutions within these settlements and at the same time locate the major traffic generating activities on major provincial highways and county roads.

A.4 PRESERVE PRIME AGRICULTURAL LAND

The better agricultural lands have a natural soil and climatic capability for higher food productivity. This generally requires the farmer to use less direct energy in plowing or draining soils and to use less artificial fertilizer. In Ontario, energy dollars tied up in fertilizers represent 33% of the total agricultural energy expenditures.

By preserving the prime agricultural land, the consumption of petroleum for farm machinery is reduced and the energy used in fertilizer production is minimized. Forty percent of energy consumed in Ontario agriculture is in the form of natural gas, 4/5ths of which is used in the manufacture of fertilizers. Preserving the higher fertility soils reduces this energy input. Areas with climatic advantages, such as increased corn heat units, also provide a higher yield with some crops resulting in less energy input per unit of yield.

Prime agricultural land is also a base for biomass which is a renewable energy source that will become useful on a localized scale for individual farms or groups of farms, (ethanol, methanol and oilseed production).

In Huron County, 89% of the land resource has classes 1 and 2 agricultural capability. The existing strength of agricultural production is indicated by the fact that 88% of the County consists of active farmland (improved and unimproved). Provincially about 4.4 million hectares of foodland were devoted to field crops in 1980 and even with productivity gains, about 5.5 million hectares will be needed in the year 2000 to maintain Ontario's current level of food self sufficiency. The future planning for agriculture should minimize the constraints of expensive energy inputs into clearing, drainage and fertility upgrading in cooler climates to achieve yield targets. Future energy costs will be higher than current costs, making the dollar cost per unit of food production even higher. Huron County, endowed as it is with high quality improved land has a provincial role to play in achieving food production goals and objectives with the least energy cost.

A.5 OPTIMIZE PARCEL SIZES FOR FIELD OPERATIONS

The only data found which compared farm size with energy consumption were documented in a report on a national farm energy survey conducted in 1982 (1981 data).

We have selectively summarized the data for central Canada as follows:

	FARM CLASSES		
	$5,000-$49,999 receipts	$50,000-$99,999 receipts	(greater than or equal to $100,000 receipts)
Farms Reporting	48,417	20,016	20,564
Average Farm Size (ha)	68.8	106.9	128.1
Average Energy Expenditure per ha	$29.84	$37.04	$77.70
Average Energy Expenditure per $ of sales	$ 0.10	$ 0.06	$ 0.04

Although the energy expenditures per dollar of sales reflects some efficiencies of scale, the actual dollars of energy expenditure per hectare actually increase dramatically with the larger farms. This does not appear to be a reflection of reduced energy efficiency however, as the disproportionate increase in average farm size with economic class reveals more intensive agricultural use on the farms with the bigger dollar returns. This results in higher energy inputs per area of production of specialty crops and other forms of intensive food production.

There are no data to confirm thresholds on farm size and energy efficiency. Although there may be energy savings for very small, part-time operations with a high degree of labour or low horsepower machinery input, there appears to be an energy advantage tied to field timeliness of machinery and efficiencies of scale with full time commercial operations.

With this principle in mind and in keeping with the principal of preserving prime agricultural lands, farm sizes should be kept as large as possible. The advantage is to maximize energy efficiency of field operations in commercial production by minimizing land parcel fragmentation and maximizing the continuity and size of farm operational units.

A.6 LOCATE PROCESSING AND MARKETING AREAS CLOSE TO PRODUCT SOURCE

Food processing plants, grain elevators, stockyards and markets should be located centrally within the area of the main product source. This allows farmers to transport these products over the shortest possible distance.

In Huron County, all of the larger settlements now contain processing plants, elevators and feed mills thereby providing generally uniform accessibility throughout the County.

New processing and marketing facilities should be locatd within or close to the existing settlements and product source.

A.7 ESTABLISH AND MAINTAIN AGRICULTURAL SERVICE SETTLEMENTS

Agricultural related commercial activities such as feed mills, fertilizer sales, machinery sales and service should be located within existing settlements closest to the market area. All new uses should be located on existing provincial highways or county roads.

The advantage is that existing roads are utilized and physical linkages to related economic activities within the settlement can be established.

A.8 PROTECT WOODLOTS

Existing coniferous woodlots moderate the local climate by buffering the prevailing northerly and westerly winter winds. This reduces the velocity of wind against existing buildings and moderates the snow loads particularly on roads. The particular benefits are reduced exposure of building surfaces to cold winds and reduced snow plowing on roads.

In settlements where woodlots do exist, they should be protected where possible.

Deciduous woodlots also provide a renewable energy source which is available for residential and farm space heating purposes. There is evidence of the utilization of wood in the northern and northeastern townships in the County.

The protection of woodlots also requires the long-term management of the resource in order to maintain its productive life. The best potential for woodlot management and the production of fuel wood is within the northern townships (except Ashfield). Throughout the County, there are approximately 2,300 hectares (5,680 acres) owned by the County and the Conservation Authority as Agreement Forests.

A.9 INTENSIFY SEASONAL SETTLEMENTS

The existing cottage areas are predominantly located along the Lake Huron shoreline. They are used during the summer season.

Except in the Bayfield village area, these cottages are located west of provincial highway 21. Vehicular access is provided from township roads which intersect with highway 21. In most instances, these cottages are one lot in depth however, they form a linear development.

Expansion of these cottage areas should occur in areas served by an existing township road thereby eliminating new road construction.

Since these cottages are utilized during the summer months there is no concern with respect to winter space heating requirements.

A.10 MAINTAIN LARGE, CONTIGUOUS AGRICULTURAL AREAS

This requires encouraging similar agricultural areas to develop as a unit in order to achieve economies of scale and to stimulate the sharing of equipment and labour.

The energy savings relate to reducing the transportation requirements within the agricultural area.

There are no supportive data to substantiate savings in this area however, with transportation representing 13% of the total expenditure in Ontario food production, any reduction in agricultural product or service transportation by maintenance of contiguous agricultural lands is likely to be worthwhile in comparison with the alternative to allow fragmented and dispersed areas of production. The larger and more contiguous the agricultural area, the more attractive it is to the agribusiness enterprises making up the sustaining infrastructure. In the case of Huron County, the implementation of Provincial Food Land policies will have this energy conservation spin off.

B SETTLEMENT LEVEL

B.1 MIXED-USE DEVELOPMENT

The combination of residential, commercial and institutional uses on particular sites within settlements reduces the incidence of multiple travel trips.

The clustering of trip destinations provides for pedestrian movements for people living within the mixed-use development.

Another form of mixed-use development is the location of agribusiness and food processing in close proximity within the agricultural area.

The mixing of uses implies a higher intensity of development which reduces the consumption of energy for space heating.

B.2 INCREASING RESIDENTIAL DENSITIES

Higher density means smaller residential lots, more dwelling units per net hectare and smaller dwelling units on a lot.

The single detached house has the relatively highest energy requirement for space heating. A semi-detached unit requires 10% less energy; a town house requires 25% less energy than a single-detached house; a unit in a small apartment building requires 50% less energy for space heating.

The advantage of multiple dwelling units is that there is a lower proportion of outside wall surfaces to interior space thereby reducing the potential of heat loss either through the wall, windows or roof.

Smaller single detached houses require less energy for space heating since there is a lesser space to be heated.

Huron County has a relative high proportion of single-detached housing units. In the Townships, 96% of the housing units are single-detached including farm houses. In the Towns and Villages, 76% of housing consists of single-detached units. The remainder are predominantly small apartment buildings (1460 units) with 4 or less storeys. There are no apartment buildings in the County with over 4 storeys.

B.3 HIGHER INTENSITY OF COMMERCIAL AND INDUSTRIAL DEVELOPMENT

This requires using a larger proportion of an individual lot for building purposes. This is achievable if the development does not interfere with the requirement for outdoor storage and display, loading areas and parking.

The greatest intensity of development allows for the clustering of activities and the reduction of trip lengths and frequencies. The development of industrial parks promotes the use of car-pooling and van-pooling. New industrial development in parks and commercial development should be located within existing settlements rather than separate from settlements to gain transportation energy savings.

B.4 CONCENTRATE COMMERCIAL DEVELOPMENT IN NODES AND ALONG CORRIDORS

The concentration of commercial development within settlements allows for one-stop shopping thereby avoiding extra travel. Within major settlements the development along a corridor may stimulate public transit.

Strip commercial development which is auto-oriented and consists of free-standing buildings should be discouraged.

The concentrated commercial development requires organized parking areas which assists in promoting pedestrian movements within the settlements.

B.5 PROVIDE LOCAL OR NEIGHBOURHOOD CONVENIENCE COMMERCIAL

For the daily needs of residents, smaller commercial development should be located within settlements where there is convenient access to a market area.

This encourages shorter trip lengths and pedestrian movements within the smaller settlements.

B.6 INFILLING OF BUILDINGS

Existing vacant lots within settlements should be utilized for new development and redevelopment rather than the outward extension of settlements. In industrial areas, the consolidation of underutilized vacant parts of lots could be used for infilling.

The benefits are the concentration of trip destinations, the use of infrastructure and the benefit of creating wind buffering for adjacent buildings.

There may be a possibility of sharing energy for space heating purposes between buildings.

B.7 RE-USE AND CONVERSION OF EXISTING BUILDINGS AND REDEVELOPMENT OF LAND

This includes the conversion of large single detached buildings into multiple units within existing settlements; adapting commercial and industrial buildings to residential purposes or for another use; and the rehabilitation of existing buildings and the redevelopment of underutilized land.

The benefits are savings in energy used for construction, and the improvement in the thermal efficiency of the buildings. There may be increasing density and intensity which improves the transportation energy requirement.

B.8 ACCESS TO PUBLIC TRANSIT

If public transit is available in a settlement, then development should provide:

bus shelters on major roads
walking paths to and from transit stop
transit routing within subdivision
a maximum five-minute walking time to transit and from transit stop.

Public transit reduces the use of cars for certain trips within settlements.

B.9 WALKING PATHS

For short distance travel, walking paths should be provided within settlements. They are suitable for paved local roads within settlements.

The path system should be utilized for walking paths and all new subdivisions should include a combination of sidewalks and paths connecting to major destinations such as shopping areas.

Within settlements, organized parking lots would be required to encourage walking within the core area.

B.10 BICYCLE PATHS

For short distance travel within settlements. They are suitable for paved local roads particularly in smaller settlements. The park system should provide bicycle paths.

B.11 INTERNAL STREET SYSTEM LIMITS

The main measures include:

Reducing pavement widths and rights-of-way requirements for local streets. This requires less asphalt for construction and reduces sun absorption area during the summer.

Reduce the number of through streets to encourage walking.

Minimize street length for local streets.

Double-load all streets.

B.12 JOINT USE OF PUBLIC FACILITIES

Multiple purpose institutional buildings should be developed and used in settlements and outside the settlements.

These include the mixing of schools, libraries, community centres, arenas, municipal buildings and adult recreation centres.

The energy savings result from reduced travel trips and maximizing the energy consumption within the building through more continuous utilization.

B.13 ALLOW HOME OCCUPATIONS

This is applicable to the settlements where such uses as medical offices, beauty salons and barber shops, small craft shops, repair shops and other personal services can locate within residential buildings.

It is preferable to allow these uses on major roads.

The energy savings apply to reduced transportation requirement.

B.14 PROVIDE LOCALIZED RECREATIONAL AREAS

Each settlement should contain active areas such as arena, sportsfield and passive areas such as day-use areas and walking and ski trails.

This reduces the need for long travelling distances for these activities.

C SITE, BUILDING, DESIGN AND OPERATIONS LEVEL

C.1 ORIENTATION OF LOTS, BUILDINGS AND STREETS WITH RESPECT TO SUN AND WIND

Orientation is important to maximize heat gains and to minimize heat losses within buildings. This is particularly important for residential dwellings.

Principles

(a) The sun is located lower in the horizon during the winter than in the summer. The sun shadows cast by adjacent buildings and structures are longer and reach into the interior of buildings.

In winter, the sun's path is 120° and therefore it is critical that a building surface receive more sun radiation from a southerly exposure. The 6-hour daily exposure period from 9 A.M. to 3 P.M. in the winter becomes important for heat gain.

The enclosed Sun Path Diagrams illustrate the typical situation in Huron County. Note that March 21 is based on Eastern Standard Time and September 23 is based on

FIGURE 8.1: SOLAR ALTITUDE AND AZIMUTH BY SEASON

43.2° N

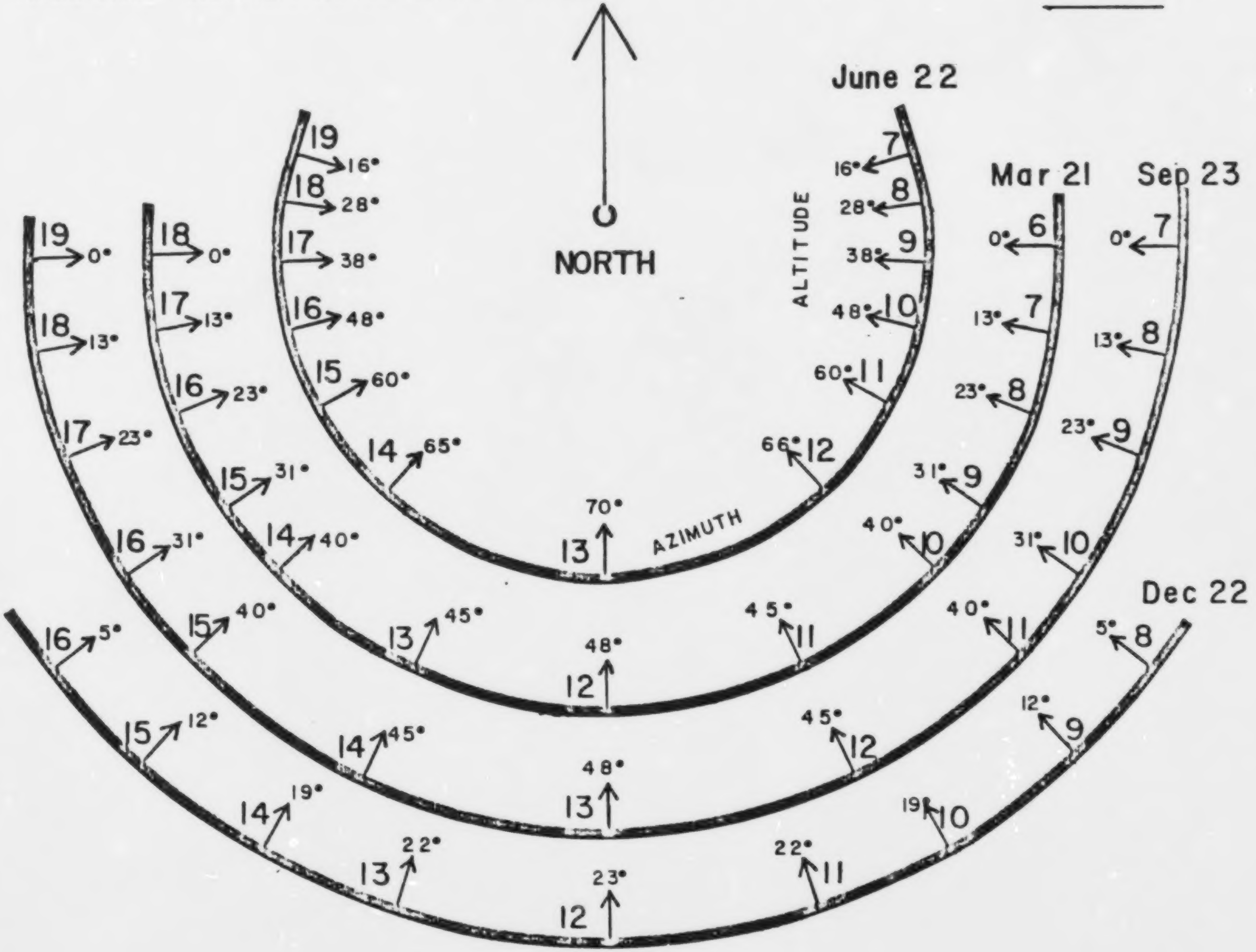
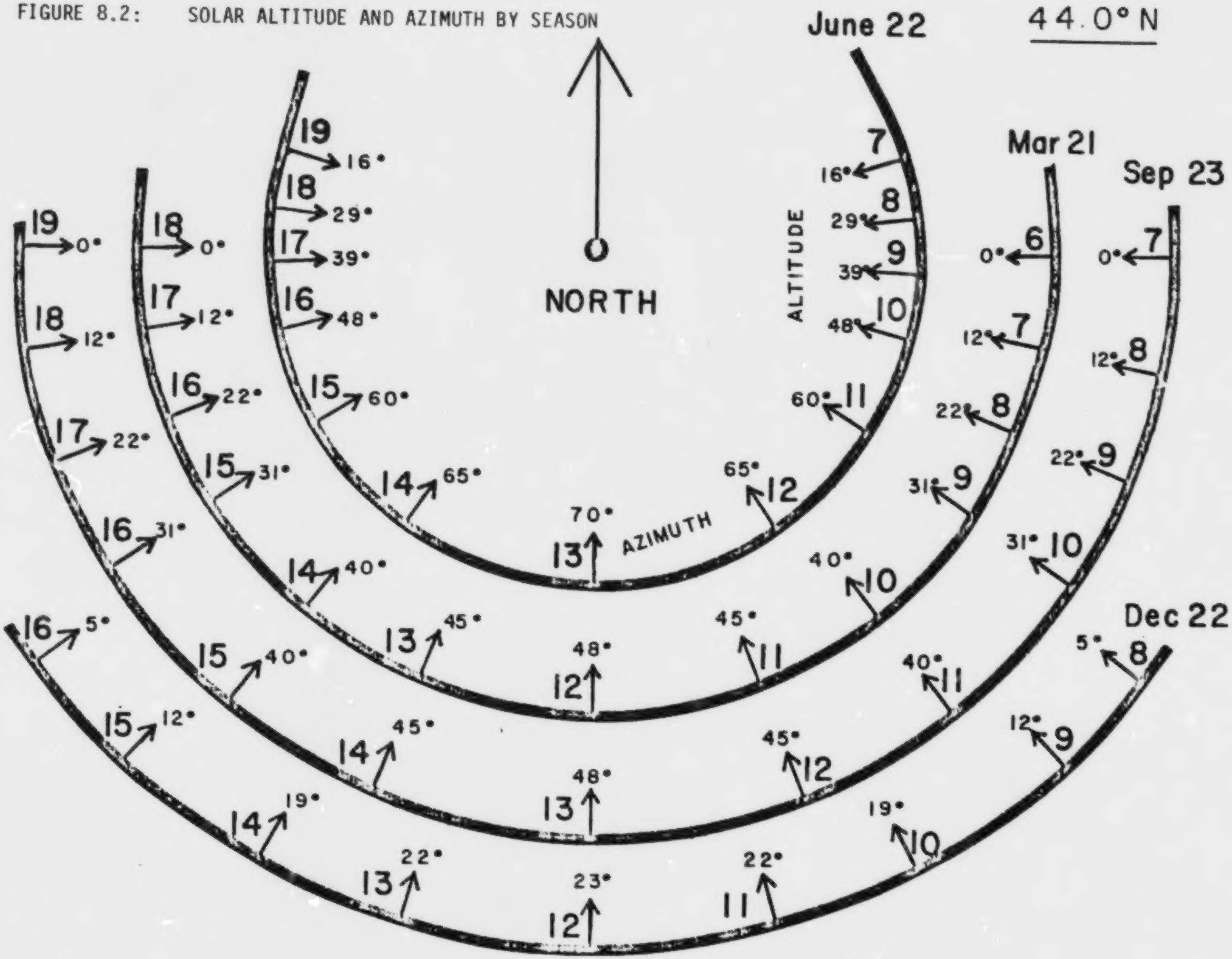

NORTH
June 22
Mar 21
Sep 23
Dec 22
ALTITUDE
AZIMUTH
7 16°
8 28°
9 38°
10 48°
11 60°
12 66°
13 70°
14 65°
15 60°
16 48°
17 38°
18 28°
19 16°
6 0°
7 13°
8 23°
9 31°
10 40°
11 45°
12 48°
13 45°
14 40°
15 31°
16 23°
17 13°
18 0°
7 0°
8 13°
9 23°
10 31°
11 40°
12 45°
13 48°
14 45°
15 40°
16 31°
17 23°
18 13°
19 0°
8 5°
9 12°
10 19°
11 22°
12 23°
13 22°
14 19°
15 12°
16 5°

FIGURE 8.2: SOLAR ALTITUDE AND AZIMUTH BY SEASON


44.0° N
NORTH
ALTITUDE
AZIMUTH
June 22
7 16°
8 29°
9 39°
10 48°
11 60°
12 65°
13 70°
14 65°
15 60°
16 48°
17 39°
18 29°
19 16°
Mar 21
6 0°
7 12°
8 22°
9 31°
10 40°
11 45°
12 48°
13 45°
14 40°
15 31°
16 22°
17 12°
18 0°
Sep 23
7 0°
8 12°
9 22°
10 31°
11 40°
12 45°
13 48°
14 45°
15 40°
16 31°
17 22°
18 12°
19 0°
Dec 22
8 5°
9 12°
10 19°
11 22°
12 23°
13 22°
14 19°
15 12°
16 5°

Daylight Savings Time. There would be an energy conservation advantage if Daylight Savings Time commenced two months earlier on March 1.

(b) The winter winds are prevailing from the north and the west directions.

Velocities are greatest at tops of hills and on the windward side of hills.

Cold air settles in valleys or low areas.

Water bodies (such as Lake Huron) have a warming effect on the adjacent land.

Guidelines for energy conservation

(a) Street orientation

As many streets as possible should be oriented in an east-west direction.

(b) Lot orientation

As many lots should be on the north and south side of streets as possible.

The longer axis of the lot should be located within 15° of south. The best orientation is slightly to the south-east in order to capture more of the morning sun radiation.

(c) Building location and orientation

There should be a minimum number of building openings on the northerly exposure. The largest window area should be on the southerly exposure.

The east-west axis of the building should allow even solar radiation of the building.

Single-detached dwellings should be located on east-west streets.

Attached dwellings should be located on north-south streets.

On larger lots (i.e. greater than 1/2 acre), building can be oriented to the south.

Building faces need not be parallel to the street.

Front yard setbacks on the north side of east-west streets are greater than front yard setbacks on the south side of east-west streets.

Front yard setbacks need to be staggered on north-south streets.

Lots on north side of east-west streets may need to be wider to provide flexibility in garage location.

The energy savings through passive solar gain amounts to 10% to 20% in single detached housing. To achieve the proper orientation in new development, variances in setbacks, heights of buildings, lot shapes and frontages may be required.

In infilling, there may need to be special consideration in zoning provisions in order to maximize exposure to the sun.

C.2 LANDSCAPING AND BUFFERING OF HOUSES AND ROADS

The purpose is to deflect winter winds and to protect buildings and structures. This is achieved by coniferous trees, hedges, fences, earth formations and other buildings and structures.

Deciduous trees should be planted on the south side of buildings to allow exposure to winter sun and shading of the summer sun.

Coniferous trees should be planted on the north and west side of buildings to allow buffering of prevailing winds and to reduce wind velocity.

Landscaping of outdoor areas (e.g. parking lots) reduces summer heat concentration and reduces summer cooling requirements.

Farm houses should be protected from prevailing winter winds by tree planting and other farm structures.

Roads adjacent to open rural areas should be protected from blowing snow by coniferous tree plantings on the northerly and westerly exposure.

Landscaping and buffering provides from 5% to 10% energy savings in buildings.

C.3 SOLAR ACCESS PROTECTION

In existing settlements, there should be a minimization of blocking the winter sun from reaching structures. This is achieved by controlling the heights of buildings and structures.

Within residential lots, there may be variations in building heights so that the building height at the south end is always higher than on the north end of the lot.

Lot widths and setbacks need to be flexibly applied according to the location and height of adjacent buildings.

There should be provisions to allow active solar collectors on buildings and to allow for greenhouses as accessory buildings on residential lots.

C.4 CLUSTERING OF BUILDINGS

This is appropriate in new residential development. Buildings are grouped in clusters on smaller lots and preserving the landscaped open space.

The results provide for landscaping, wind buffering and reduced street lengths.

C.5 MINIMUM PROPERTY STANDARDS

Standards for thermal efficiency of a property could be established as a means of assisting owners in understanding energy conservation. The standards could be applicable to older structures and be used as guidelines for minor improvements.

8.3 NON-PLANNING MEASURES

A. COUNTY LEVEL

A.1 DEVELOP NATURAL GAS AND ELECTRICITY INFRASTRUCTURE

In order to achieve the conversion from oil to natural gas and electricity, the infrastructure and capacity must exist equitably throughout the County. In Huron County, natural gas is partially available and is restricted to the areas generally south of Highway 8. Natural gas service is provided by Union Gas Limited.

There are few natural gas connections to farms because of the low density of service if farms are not within the economic distance of an existing pipeline. As an alternative, propane is readily available in the County and is easily transportable. There are three existing bulk propane distribution terminals located at Goderich, Blyth and Grand Bend.

Conversion from oil space heating systems to natural gas heating is feasible in the settlements in the southern part of the County whereas generally propane heating systems can be adapted in residences, if economically beneficial. Propane is an immediate substitution fuel on the farm for space heating and for crop drying. It is not expected that technology will be available in the short-term to allow conversion of diesel powered farm tractors and equipment to propane fuels.

Electricity is available throughout the County and is a suitable source of energy for space heating and industrial processes. There may be localized load deficiencies which prevent the use of electricity in large quantities outside the towns and villages. The local utilities and Ontario Hydro may need to increase voltage loads in rural areas. On the farm, electricity has limited potential as an alternative fuel in food production.

There may be opportunities in the County to develop hydro power systems for private use. This depends upon the availability of water in a lake, river, stream and the relative location of the electricity user.

A.2 DEVELOP LOCAL CONVENTIONAL ENERGY RESOURCES

There is no reliable estimate of oil and gas reserves within Huron County however there has been production from the Tipperary field and production of oil in the Grand Bend area. It is not expected that significant fossil fuel resources exist in the area in the long-term.

A.3 DISTRICT HEATING

This is a certralized heating system which distributes heat as steam or hot water to a group of buildings within a settlement. These systems are usually large-scale and would not be feasible within the County. There is a high cost to retrofit an existing settlement.

A.4 COGENERATION

Electricity and steam heat are produced simultaneously with heat being used as an energy source for the production of electricity or for generating steam or hot water. This is adaptable in industrial operations such as the pulp and paper industry where it has been successful and in primary metals and electricity generation.

Another form of co-generation is energy cascading where all potential energy from one source is used at different intensities. High temperature electricity which is produced could be used for low temperature space heating and subsequently used for other purposes rather than being discarded. Heat pumps are an example of cascading.

On the farm, heat may be recovered from milk during the cooling cycle or heat from a barn may be recovered by a heat pump and used for other purposes.

A.5 RESOURCE RECOVERY

Energy from wastes can be produced on a large-scale or on a small-scale although this contributes a small proportion of secondary energy requirements.

Wood waste (sawdust, chips, bark) from the forest industry is used to provide energy in sawmills and in wood-using industries.

Agricultural waste (manure, straw, plants and crops) can be used in a limited manner to produce on-farm fuel such as methane gas and ethanol. Greenhouses and barns can be heated with these alternative fuel sources.

Sewage sludge from treatment plants can be transformed into steam for heating.

Methane gas from landfill sites is being recovered and used as fuel in nearby industrial operations.

Solid waste from landfill sites, and from specific industrial and institutional operations, is burned rather than buried producing heat energy in the form of steam.

A.6 INTER-COMMUNITY PUBLIC TRANSIT

Reduce trips between communities by providing public transit. May be provided on the level warranted for specific inter-community relationships.

Candidate trips include travel to employment; weekly or semi-weekly shopping; social, cultural and recreational activities or events; and transportation for the elderly, disabled and disadvantaged. Example is special events transit service.

May be integrated with B.3 Ride Sharing and B.4 Para-Transit, to provide settlement and inter-settlement transit hierarchy.

Objective is the reduction of transportation energy.

Implementation requires comparison of population components with work, shopping and social/cultural/recreational centres.

A.7 FREIGHT CONSOLIDATION

Rail and truck transportation terminals should be located close to each other within the county. The exchange of goods between truck and rail and between trucks in one or more convenient locations reduces excessive trips.

A.8 TELECONFERENCING

Reducing travel through telephone communication is achievable with the new technology available to the industrial and commercial sectors.

B. SETTLEMENT LEVEL

B.1 MUNICIPAL OPERATIONS MANAGEMENT (PHYSICAL RESOURCES)

Reduce energy consumption in establishment and delivery of municipal services - roads; water supply and distribution; sewage disposal; municipal lighting; and vehicle operation and maintenance. Includes planned reductions in unit costs of construction and maintenance of existing and proposed infrastructure.

1. MUNICIPAL ROADS

Minimize extent of road network; provide buffering for wind/snow protection or, where appropriate, elevate road to minimize snow accumulation. Analyse road network as population and employment shifts occur, to provide most direct routes.

Criteria for planning and design of roads should incorporate maintenance reduction features directed toward minimum energy consumption. Increased road construction costs and higher servicing standards may be justified where the result in reduced annual maintenance costs.

Consider energy/maintenance effort reduction in setting priorities for road improvements, reconstruction and maintenance.

2. MUNICIPAL WATER SUPPLY AND DISTRIBUTION

Minimize energy consumption in planning water supply works, treatment facilities, storage requirements and fire protection procedures. Relates to utilization of existing infrastructure; high efficiency equipment; alternate fuels; re-rating of supply capacity; and reduction of system losses and per capita consumption.

Consider energy consumption in hydraulic design of distribution networks. Includes larger pipe diameters; minimizing valves and bends; looping; and reduction of service connection length, to reduce friction losses.

Encourage private and communal wells, where cost-effective; subject to requirements for fire protection capability.

Minimize water consumption. Includes metering; reduced flow fixtures; re-use; and distribution system leak surveys. Relates to reduced wastewater discharges to sanitary sewerage system.

3. SEWAGE COLLECTION AND TREATMENT

Minimize energy consumption in pumping and treatment of wastewater. Includes development priority for lands serviced by gravity flow; high efficiency equipment; re-rating; alternate fuels; and recovery of energy from waste heat, process gases and effluents.

Reduce wastewater flow through lower water consumption; re-use of process and cooling water; and reduction of infiltration/inflow from sanitary collection system, storm sewers, service connections and foundation drains.

Re-examine need for sanitary sewerage systems for development and re-development areas that can be serviced by private sewage systems. For private system planning, concentrate development in areas where soil suitability minimizes extent of leaching bed; and minimizes or eliminates the need for electrical/mechanical systems. At site planning level, arrange buildings, septic tank and leaching bed so as to avoid earth fill and pumping.

4. SOLID WASTE COLLECTION AND DISPOSAL

Objective is to minimize waste of recoverable resources and reduce fuel required to transport solid wastes.

Locate solid waste recovery/disposal sites in proximity to waste generation centres. Consider alternative methods to minimize vehicle trips through central collection services and transfer stations.

Encourage examination of source separation; recycling; and solid waste utilization, under present conditions, and on a regular basis, in the future, as conditions warrant. Include, in economic development initiatives, consideration of commercial/industrial waste products generation and opportunities for re-use of solid waste components in industrial processes.

5. MUNICIPAL OUTDOOR LIGHTING

Improving the energy efficiency of municipal outdoor lighting, for streets, parking, and recreation areas reduces the operating cost to the municipality.

High pressure sodium lamps exhibit high energy efficiency and acceptable colour rendition for new installations. Conversions may also be cost effective, when energy, maintenance and replacement costs are compared, particularly for the replacement of existing incandescent lamps.

6. VEHICLE OPERATION AND MAINTENANCE

Objective is to minimum energy consumption through more efficient operation and fuel conversion.

Reduced energy consumption can be achieved through improved driving practices; regular tire and mechanical tune-up; and better vehicle utilization. For new vehicle purchases, energy efficient features, such as radial tires, improved transmissions and axle ratios and fuel injection or turbocharging can be considered.

Fuel and operating costs can be reduced through conversions to diesel and propane.

B.2 TRAFFIC MANAGEMENT

Optimize smoothness of traffic flow so as to minimize transportation energy consumption through speed control; traffic control devices; and on-street parking management. Objectives are to reduce speed, speed changes and stops, for improved fuel efficiency; to improve traffic operations; to minimize maintenance costs; and to maximize road capacity.

1. TRAFFIC SPEED

Plan and manage facilities to operate at optimum speed, in establishing speed limits; through geometric design, to enhance sight distances and minimize abrupt changes in horizontal and vertical alignment; and by coordination of traffic signs and signals. Enforce speed limits. Update road network priorities, consistent with shifts in population and employment, to provide best road conditions along most direct routes.

2. TRAFFIC CONTROL DEVICES

Plan for smooth traffic flow. Where possible, install group signalization, with peak hour timed signals and off hour flashing lights.

Re-examine municipal policy governing use of stop and yield signs with objective of minimizing traffic starts and stops.

3. ON-STREET PARKING

Regulate on-street parking to improve two way traffic flow and road maintenance, particularly snow removal.

B.3 RIDE SHARING

Sharing rides in a car or in a van for work trips and to other destinations reduces the number of vehicles on the road. Gasoline consumption is reduced and if it is effective within a community, it reduces the needs for road capacity.

Industries, offices and institutions can organize car pools and van pools amongst employees who live within relative proximity to each other or live enroute to the destination.

Ride sharing could be used for trips outside the County.

B.4 PARA-TRANSIT

This includes a system of short-term rental cars, taxis, dial-a-ride services and mini-bus services. It is expected that full-scale public transit will not be available within settlements in the County. As an alternative, specialized services can be made available by the private sector where there is a demand.

B.5 LOCAL FOOD PRODUCTION

With the prime agricultural land in the County, there is an opportunity to provide local garden plots for residents of the settlements. Food production for individual families requires labour intensive cultivation instead of energy-consuming machinery and fertilization.

Localized farmer's markets within the settlement and on-farm sales to local residents reduces the need for processing, packaging and long-distance transportation.

B.6 IMPROVED TRANSPORTATION OF FARM PRODUCTS FROM FARM

Agricultural trucking is generally organized with energy efficiency in mind. Some marketing boards have control of commodity transportation and have set up very efficient transportation systems that minimize fuel use.

Regulations could be amended in some cases to allow backhauls and combined product trips. Limiting the movement of farm products through such innovative procedures as video system livestock sales can save energy by eliminating transport to a public market.

Transportation costs can be reduced by a whole range of improved technology such as automatic fans, streamlining trucks, airfoils, more efficient engine design, radial tires, better engine maintenance, lower speeds, increased payloads and rationalized routing.

C. SITE, BUILDING, DESIGN AND OPERATIONS LEVEL

C.1 OUTREACH

There is a wealth of information and expertise now available to residents, industries and the agricultural community within the County. The literature is generally easy to understand and can be made available through libraries, schools and municipal offices. Both the federal and provincial governments advertise extensively and provide direct financial and technical assistance to people who wish to convert from oil; conserve energy or use alternative fuels and renewable sources.

A successful outreach program requires calling attention to the energy problem, making the energy objectives easy to understand, and identifying the incentives to each sector within the County.

The Ontario Ministry of Energy's Community Energy Management Demonstration program has been initiated by 4 cities to prepare strategic plans for energy management.

A well-organized community energy awareness program at the County level can direct attention and give guidance to the various sectors. The municipalities themselves would establish objectives within its own operations.

The achievement of the energy objectives in Huron County cannot be made compulsory and requires the voluntary participation by the energy users. In most cases, common sense should prevail.

The most achievable energy conservation measures consist of these common sense actions by people which do not require a major investment or complicated technology.

- turning down thermostats during the night-time at home and at off-peak periods in factories and offices (maximum cut-back should be 3C.)
- driving cars and trucks within the speed limit.
- maintaining the efficiency of car and truck engines
- maintaining maximum tire pressures and using radial tires
- reducing or eliminating car and truck idling time
- reduce heating of un-occupied or seldom occupied areas such as storage spaces, lobbies, garages, washrooms, corridors
- regularly maintain heating systems
- annually undertake an energy audit to determine pattern of energy consumption
- reduce lighting requirements and establish task lighting
- combine travel trips for shopping, work, visiting
- use a block heater for cars and vans in winter
- consolidate truck delivery routing
- turn off lights, appliances and office equipment when not in use
- use drapes to help insulate north and west exposed windows in winter and to allow sun to penetrate south and east exposed windows
- use more efficient luminaries indoors and reduce unnecessary outdoor lighting
- reduce temperature of hot water.

C.2 RETROFIT BUILDINGS

This involves the installation of energy-efficient systems for heating. Examples are active solar water heaters for industry and office buildings; and conversion of oil heating to gas or electrical systems.

Retrofitting is determined by need and the pay-back on the investment in energy savings.

C.3 IMPROVE THERMAL EFFICIENCIES OF EXISTING BUILDING ENVELOPE

The orientation of a building in relation to the winter sun and the buffering of a building against the prevailing winter winds determines the heat gains or the passive solar gain.

The construction of the building and its resistence to cold determines the level of annual winter heat loss. The purpose of upgrading the thermal efficiency of an existing building is to reduce the heat lost from inside the building envelope. Heat flows or is transferred from a space with higher temperature (inside) to a space with lower temperature (outside). The rate of flow depends upon the difference in temperature between the inside of a building and outside a building and the resistance of the building to heat loss.

There are three ways in which heat is lost:

1. conduction: when heat is transferred to colder materials such as the building shell or the air inside the wall or ceiling spaces.
2. convection: when heat moves through a room and may be cooled by the cold exterior wall or ceiling and it recirculates and rapidly cools other heated air in a space.
3. radiation: when heat is transferred from a heated room through a wall or window to the outside.

Warm air which is lost is replaced by cooler outdoor air. For every degree Celcius of difference between outdoor and indoor temperature, each cubic metre of air exchanged inside the building causes a loss of 1,300 joules of heat energy depending upon the number of air exchanges, the volume of the building and the temperature difference. In an older conventional house, between 60% and 70% of energy is lost through the shell.

The objective in any building type is to equalize the heat gains and the heat losses. The amount of heat load from a heating system is determined by the amount of heat loss less the heat gained from lighting sources, appliances, solar radiation and water heating. There are five normal paths of heat loss in a building:

foundation or exposed floor: 27% of heat loss
walls: 20% of heat loss
windows and doors: 19% of heat loss
roof or ceiling: 9% of heat loss
air exchange: 25% of heat loss.

Insulation in a wall or ceiling slows down heat transfer to the outside and it diffuses radiation of heat. The resistance to conductance or R-value of a building component is a measure of a wall or ceiling's insulating property. The R-value is expressed as square metre celcius degree per watt and the higher the R-value the greater the effectiveness of the insulation.

The recommended insulation standards from the Ontario Building Code for new residential buildings in Huron County are as follows:

Exposed roof (attic)	R-32 (RS1 5.6)*
Roof and ceiling	R-20 (RS1 3.5)
Walls exposed to outside	R-12 (RS1 2.1)
Floors over unheated spaces	R-26 (RS1 4.6)
Basement walls above grade	R-12 (RS1 2.1)
Basement Walls below grade	R-8 (RS1 1.4)
Concrete floor - heated	R-8 (RS1 1.4)
Concrete floor - unheated	R-10 (RS1 1.8)

* metric measurement

In Huron County, the winter degree days increase in number from Lake Huron easterly and therefore, depending upon other variables, the need for insulation to prevent heat loss is greater as we move further away from the lake. In the renovation of existing homes, it is suggested that these newer standards be adapted where it is economically feasible. The Canadian Home Insulation Program (CHIP) provides taxable grants of up to $500 to assist in material and labour costs for increasing the thermal efficiency of residential buildings constructed before January 1, 1971.

In considering insulation, we are also reducing ventilation of the building and thereby increasing moisture and condensation within the building. The thermal efficiency requirements are to install an air vapour barrier near the warm inside walls. This barrier also prevents the movement of warm/humid air into the wall spaces causing the insulation to rot.

Other methods of increasing the thermal efficiency of a building are:

caulking and weatherstripping doors, windows, attic hatches, chimneys, foundation, electrical outlets, baseboards, vents
installing storm windows, storm doors and insulated doors
insulating forced air heating ducts
reducing the size of windows and doors exposed to north and west
tighten up exposure of fireplace chimney
seal all cracks in foundation and walls
enclose a porch to create an air-lock entrance.

It is estimated that up to 25% can be saved on heating costs annually through the improvement of thermal efficiency in homes.

C.4 UPGRADE THERMAL STANDARDS OF NEW HOME CONSTRUCTION

The Ontario Building Code, effective November, 1983, sets out the standards for conventional thermal efficiency in the following sections:

Part 5	Wind, Water and Vapour Protection
Part 6	Heating, Ventilating and Air-Conditioning
Section 9.26	Thermal Insulation and Vapour Barriers
Section 9.34	Heating and Air-Conditioning
Section 9.39	Thermal Design

Both the Government of Canada and the Government of Ontario are sponsoring demonstration projects for low energy new houses. Canada's program, "Super Energy Efficient Housing Program" projects the construction of 70 homes in Ontario and Ontario's "Affordable Low Energy New Housing Program" expects to build 90 homes.

The newer standard is R-2000 and include high levels of insulation, airtight house construction, mechanical ventilation systems, double or triple glazed windows and energy-efficient space heating equipment.

This energy performance standard is expected to reduce energy consumption for space heating by up to 87%. For example, a typical 130 m^2 house in Huron County is estimated to use 130,000 MJ per year in conventional energy. The R-2000 standard could reduce the consumption to 17,000 MJ per year.

Heat in this energy efficient house would be "created" by the sun, heat generating appliances used in the house and by people living in the house.

C.5 CONVERSION TO ALTERNATE FUELS AND RENEWABLES

This includes:

1. Conversion of heating systems from oil source to natural gas or electricity or propane or wood.

2. Conversion of gasoline-using engines to propane or compressed natural gas or methanol or ethanol blends.

4. Install active solar heating systems for hot water, industrial water needs and swimming pools.

C.6 IMPROVING OPERATIONS AND DESIGN TECHNOLOGY (IN INDUSTRY AND) ON THE FARM

Considerable agricultural research effort has already been undertaken to explore methods of saving energy on the farm. There are numerous design and operational techniques directed at energy conservation in agriculture, many of which are continuing to be tested in major ongoing research efforts. Where cost-benefit is proven, these alternative approaches to design or operation will be implemented voluntarily over time. The County can however, adopt supportive policies and encourage the process of technology transfer, including outreach programs, demonstration projects and information outlets. Joint involvement with both Federal and Provincial initiatives by the County is recommended to enhance the process of educating the farm energy user in Huron.

Below is a brief summary listing of some of the varied types of energy conservation measures which can be adopted on the farm.

This list is designed to be representative rather than comprehensive. The literature describes a multitude of design and technical measures which are available or are being tested. The OMAF publications, research reports and the fact sheets, as listed in report section 12.4 describe other specific measures which are currently being developed.

Gasoline-Diesel Conversion

Fuel volume requirements are reduced by 25% compared to gasoline saving up to 7% of present farm fuel requirements. Conversion in Ontario is estimated at 80% now and 95% by the year 2000.

Improved Equipment Operation

Possible savings of up to 20% of fuel used in the operation of farm machinery through more accurate gear selection, loading and equipment matching. For example, speed reduction from 11 to 8 kph can save 28 percent of fuel, however, modern tractors are generally designed for high engine speeds. Another possibility is combined field operations, (for example, tillage and herbicide application) or direct combining eliminating swathing (saving 30%) where conditions permit.

Reduced Tillage

Reducing depth and frequency while maintaining yield is the goal. U.S. research indicates fuel consumption variation of 700% depending on mode of tillage. Other possibilities include eliminating headland turning (10% saving). Reducing herbicide or pesticide applications are not recommended as these are usually energy efficient means of plant protection.

Grain Drying and Storage

Lowering grain corn moisture (29% to 15%) requires the removal of 5 kg of water per bushel. More efficient driers are coming on the market, (35% saving) as are alternative drying systems such as dryeration, low temperature drying, combination drying and old fashioned crib drying. There is also work being done on high-moisture storage.

Fertility Management

If fertilizer becomes scarce or, due to high energy costs, becomes prohibitively expensive, the higher quality agricultural land will produce the highest yields because of inherent fertility.

Topsoil conservation is important to reduce nutrient input and tillage requirements. Legume crops replace nitrogen through fixation and are a valuable green manure crop.

Soil analyses and fertilizer recommendations (O.M.A.F.) can result in better fertilizer prescriptions.

Poor manure storage can result in nutrient loss and should be avoided where possible. Manure reduces fertilizer manufacturing energy requirements. If manure could replace fertilizer in corn production, a 25% energy saving would result. A combination of legumes and manure application could result in energy savings between 25% and 50%.

Animal Housing

Poultry and hog farms could save space heating energy with high efficiency natural gas furnaces where it is available. Gas fired infra red heating systems also can save on energy by utilizing localized radiant rather than overall space heating.

Upgrading insulation, caulking and weather stripping has obvious benefits by reducing energy loss.

Interlock controls to prevent simultaneous operation of heating and secondary ventilation systems can reduce heating loads in hog and calf barns by 30%. Heat exchangers on ventilation exhaust can save 33%.

Other energy conservation methods include heat recovery from milk, reducing light wattage and utilizing dimmers and timers and utilizing improved efficiency electrical motors.

Transportation

Regulations should be amended to allow backhauling whenever possible. Rationalized routing should be undertaken for product transport and delivery. Limiting farm product movement through such means as video system sale outlets for livestock save transportation energy. Truck operation, design and maintenance can improve energy efficiency (for example, use of radial tires and airfoils).

Greenhouses

Twenty percent of greenhouse product costs are tied up in fuel supply for heating. Improvements in thermal efficiency can improve overall energy efficiency by up to 50%. Such technology includes use of glazing, thermal blankets, insulation, more efficient boilers and motors, use of hot water instead of steam, heat reclamation, infrared heating, more efficient soil sterilization, reduced useage during cold periods, temperature reduction, night splitting of temperature levels, crop choice by planting date, movable benches, multiple shelving, smaller unit size and prefinished crops.

Fuel Substitution

In the short term there are only three practical replacement sources for crude oil products on the farm, namely electricity, natural gas and propane. In situations where it is available and for stationary uses, natural gas is the least expensive substitute, followed by propane and then electricity.

The unavailability of natural gas distribution systems in rural areas is the main limitation in Huron. Propane distribution systems are becoming more common in rural areas. Propane is more easily transportable by both pipeline and truck.

Propane conversion of spark ignition engines on the farm (e.g. farm trucks) can assist in achieving the "off-oil" objective.

As for electricity, three-phase electrical power suitable for larger on farm stationary equipment is not widely used in rural areas. If made available, there could be substantial energy savings.

Methane from manure is not yet cost competitive with other fuels. It is likewise estimated that small scale, on-farm alcohol plants will not be competitive until crude oil reaches $125-$150 a barrel.

Windpower may have economic application for remote water pumping. Eventually solar systems engineered for farm buildings will become economic although this is not expected over the short run.

Biomass burning technology is, as of yet, not fully developed and brings with it the issue of organic matter depletion in soils which can be counter productive to energy objectives.

Wood supplies are dwindling with conversion of bush lots to cultivated land. Labour and handling costs and efficiency and safety of available technology are concerns which limit the use of this alternative fuel for stationary uses.

The implementation of the above measures depends a great deal on further research and development and on proved cost effectiveness. In addition, implementation is very much dependent on an increased energy awareness in the agricultural sector. This is where supportive policies and assistance in programming extension education on the part of the County can be very fruitful. Use of mobile and stationary demonstrations, and other resources available from provincial extension outlets, such as the Ministry of Agriculture and Foods' Agricultural Energy Management Resource Centre, can do much to identify conservation opportunities in the County and to provide advice on implementation and information on costs. Individual farm energy use analysis programs would be useful. Tax incentives at both the Federal and Provincial levels will also encourage the adoption of energy efficient equipment and methods.

9.0 DETERMINING APPLICABILITY OF PLANNING MEASURES

Each of the Planning Measures in each of three levels were examined to establish whether they have a practical application in each of the six settlement types.

The judgement on applicability is determined by the energy conservation objectives and the nature of the measure itself.

The results of this determination are summarized in the following chart. It is concluded that all of these planning measures, except providing access to public transit, can be applied to Huron County.

APPLICABILITY OF PLANNING MEASURES

COUNTY LEVEL PLANNING MEASURE	SETTLEMENT TYPE 1 Urban	2 Urban Limited	3A Residential 50+ dwellings	3B Residential less than 50 dwellings	4 Scattered Residential	5 Farm	6 Seasonal
NO SPORADIC NON-FARM					X	X	X
EXPAND BUILT-UP AREAS	X	X	X	X			
USE INFRASTRUCTURE	X	X					
PRESERVE PRIME LAND						X	
OPTIMIZE PARCEL SIZE FOR FARMS						X	
PROCESSING/MKTING LOCATIONS	X	X	X	X		X	
AGRICULTURAL SETTLEMENTS	X	X	X	X			
PROTECT WOODLOTS						X	X
INTENSIFY SEASONAL							X
CONTIGUOUS AG. AREA						X	

X means Applicable

APPLICABILITY OF PLANNING MEASURES

SETTLEMENT TYPES

SETTLEMENT LEVEL	1	2	3A	3B	4	5	6
PLANNING MEASURE	Urban	Urban Limited	Residential 50+ Dwellings	Residential less than 50 Dwellings	Scattered Residential	Farm	Seasonal
MIXED-USE DEVELOPMENT	X	X	X				X
INCREASE DENSITY	X	X	X				X
INCREASE INTENSITY	X	X	X				
COMMERCIAL CONCENTRATION	X	X					
NEIGHBOURHOOD COMMERCIAL	X	X	X	X			X
INFILL	X	X	X	X	X		X
RE-USE AND CONVERT BUILDINGS	X	X	X				
ACCESS TO PUBLIC TRANSIT							
WALKING PATHS	X	X					
BICYCLE PATHS	X	X					
INTERNAL STREET LIMITS	X	X					
JOINT PUBLIC FACILITIES	X	X	X	X		X	
HOME OCCUPATIONS	X	X	X	X	X	X	X
LOCALIZED RECREATIONAL	X	X	X	X		X	

X means Applicable

APPLICABILITY OF PLANNING MEASURES

	SETTLEMENT TYPE						
SITE LEVEL	1	2	3A	3B	4	5	6
PLANNING MEASURE	Urban	Urban Limited	Residential 50+ Dwellings	Residential less than 50 Dwellings	Scattered Residential	Farm	Seasonal
ORIENTATION TO SUN/WIND	X	X	X	X	X	X	X
LANDSCAPE/BUFFERING	X	X	X	X	X	X	X
SOLAR ACCESS PROTECTION	X	X	X	X			X
CLUSTERING	X	X					X
MINIMUM PROPERTY STANDARDS	X	X	X	X	X	X	X

X means Applicable

10.0 DETERMINING ACHIEVABILITY OF PLANNING MEASURES

10.1 Meaning of Achievability Level

The existing county planning documents and provincial statements are analyzed to determine whether the applicable planning measures are in fact achievable through the planning document. Each of the planning documents were assessed by each planning measure for each municipality. There is no further assessment of planning documents by settlement type within each local municipality. A full explanation of each of the planning documents is available from the Department of Planning and Development.

The criteria to determine the level of achievability are as follows:

ACHIEVABLE:	The official plan, secondary plan and/or zoning by-law or Food Land Guideline contains a planning policy or provision which allows the minicipality or the County and the property owner/ user to achieve the planning measure. The statement of policy or the provision does not imply that the planning measure will or must be achieved but is supported.
PARTIALLY ACHIEVABLE:	The official plan, secondary plan or Food Land Guideline contains a goal or objective supporting the planning measure or the policy statement is not definitive or partially supports.

NOT ACHIEVABLE:	There is no official plan, secondary plan, zoning by-law or Food Land Guideline statement which appropriately considers the planning measure or supports it.

The existing planning documents which have been assessed for achievability are as follows.

Huron County Official Plan	Approved June 28, 1973
Clinton Official Plan	Proposed
Exeter Official Plan	Approved
Goderich Official Plan	Approved
Seaforth Official Plan	Approved January 10, 1983
Wingham Official Plan	Approved January 26, 1970

County Secondary Plans (Official Plan Amendments)	
Bayfield	Approved November 18, 1976
Blyth	Approved January 9, 1981
Brussels	Approved September 29, 1976
Hensall	Approved August 15, 1979
Zurich	Approved June 2, 1975
Ashfield	Approved June 6, 1983
Colborne	Approved March 17, 1979
Goderich Township	Approved February 15, 1979
Grey	Approved October 15, 1976
Hay	Approved November 10, 1982
Howick	Adopted September 24, 1976
Stanley	Approved November 29, 1982
Stephen	Approved October 13, 1981
Tuckersmith	Adopted June 2, 1983
Turnberry	Approved March 30, 1983
Usborne	Approved December 6, 1978
East Wawanosh	Adopted June 24, 1982

The Huron County Official Plan is used in Hullett, McKillop, Morris and West Wawanosh Townships.

ZONING BY-LAWS

Clinton Zoning By-law	1970
Exeter Zoning By-law	1978
Goderich Zoning By-law	1972
Seaforth Zoning By-law	1979
Wingham Zoning By-law	1974
Bayfield Zoning By-law	1969
Zurich Zoning By-law	1975
Colborne Township Zoning By-law	Proposed

Foodland Guidelines

Agricultural Code of Practice

10.2 Applicability and Achievability of Planning Measures

The applicability of planning measures has been determined for each of the six types of settlements which have been identified within Huron County. A chart has been drawn up to reflect this. An index has also been established to illustrate the achievability of these planning measures within applicable settlement types determined by references made in county, township, village and town plans. See the detailed explanation of each official plan. What follows is an explanation of the logic involved in determining applicability and achievability and an outline of plan references to the planning measures. The Achievability Index for each Planning Measure in each local municipality follows this explanation.

A. COUNTY LEVEL

A.1 DISCOURAGE SPORADIC NON-FARM RESIDENTIAL DEVELOPMENT

As this planning measure is only applicable to the rural and rural-urban fringe, only the county and township plans were assessed. The area within the urban boundaries has been designated for urban development.

Within each of the township plans, a pattern has been developed which builds up this planning measure from the general to the specific. Each of the secondary plans has principles and objectives which outline the value of agricultural land and the pressures for and negative effects of non-farm residential development. They clearly state that such development should not continue. These plans have goals which state that uses not related to agriculture should not be located within the agricultural designation. Contained within most land division policies is a statement which does not allow severances which have the effect of creating non-farm parcels but flexibility of farmsize is encouraged and smaller farms potentially could fall out of production and the land be used for residential purposes. Additional agricultural policies include discouraging retiring farmers and surplus residences from being separated from the farm unit, although such severances are not prohibited and are limited only to avoiding or using only Class 1 and 2 farmland. A few plans allow small agricultural holdings only if productive farmland is not taken and the land cannot be used by adjoining farmers. Recreational policies in many plans limit cottage development to existing built up areas and incorporate zoning provisions to keep them seasonal in nature.

The Huron County Official Plan is in effect in four municipalities (townships) which, at present, have no secondary plans. This plan has within its agricultural designation, a provision which allows limited residential uses provided they are in conformity with the land division policy. Within the land division policies, however, the prevention of scattered isolated residential development is a primary goal.

Thus, all the townships within Huron County have plan provisions which make the discouragement of sporadic non-farm residential development achievable.

A.2 EXPAND EXISTING BUILT UP AREAS, PARTICULARLY ON MAJOR ROADS

The applicability of this planning measure is determined to include settlement types 1, 2, 3A and 3B which are the existing towns, villages and hamlets.

When assessing achievability of this planning measure the term "expand" requires qualification and is interpreted to mean that growth could occur either within or on the periphery of established boundaries. All plans have objectives or goals which allow or encourage growth of settlements within their existing boundaries. Generally, policies allow those settlements that have not developed to their boundary to expand to that point and all allow infilling. A few plans are encouraging pursuing annexations and most allow infilling on existing sporadic strip development. Most plans, however, express a desire to contain urban development within boundaries, as their expansion beyond would involve the loss of prime agricultural land.

All of Type 1, 2 and 3 settlements have plans in place which would make this planning measure, as qualified, achievable.

A.3 UTILIZE AND MAXIMIZE EXISTING INFRASTRUCTURE

As this planning measure serves to direct growth where services and facilities are in place, only those settlements which have such facilities were felt to be applicable (Type 1 and 2, towns and villages). All these settlements (with the exception of Wingham where the plan does not address the matter) have plans in place which make the maximization of the infrastructure achievable. Most plans have principles or assumptions and policies in place for residential, commercial and industrial development to be directed where the expansion of services is unnecessary and services are already in place. Most of these plans have assessed the capacity of their infrastructure and have limited growth to the extent that major additions need not be made in the near future.

A.4 PRESERVE PRIME AGRICULTURAL LAND

As Settlement Types 1, 2 and 3 have established their urban boundaries, this planning measure is applicable in the rural areas or Settlement Type 5 (farms).

In the township plans, the primary objectives and principles are to protect the agricultural base by containing urban growth within settlement boundaries and by designating large areas as agricultural, even if they are not currently in production. The majority of the township is subject to agricultural goals and policies. A goal within all township plans is that Class 1 and 2 farmland is to be prevented from having non-agricultural uses. This goal is carried through, in many policies regarding the avoidance or minimum use of Class 1 and 2 farmland in establishing agribusiness operations and separating farm houses for retiring farmers or surplus dwellings. Although farm-related severances are allowed and a residence may be built, township plan policies state that long term viability must be established for both severed and retained parcels.

The Huron County Official Plan, as applied in the four townships without secondary plans, has only allowed this planning measure to be partially achievable. In its agricultural land use designation the plan suggests that the predominant use of the land is to be farming, however, other uses (agribusiness, commercial, residential and recreational) are permitted subject to other sections of the plan. Land division policy allows severances for farm consolidation, retiring farmers and sons and daughters involved in the farm operation and dwellings may be built on these severed parcels, and as a result, prime agricultural land may be lost from production.

A.5 OPTIMIZE PARCEL SIZE FOR FIELD OPERATIONS

The principles of maximizing energy efficiency in field sizes and minimizing land parcel fragmentation are incorporated in this planning measure to optimize farm size, which is applicable in the rural areas or settlement type 5.

The township plans, which deal with this planning measure have goals which encourage flexibility of farm size. Land division policies consider viability of farm operation to be the means by which severance of agricultural land can be assessed. Although policies have been included to limit non-agricultural severances, the issue of farm-related severances has not focused on optimizing farm size in the plans. In most township plans, farms created with acreages of less than ninety acres are subject to a viability assessment, however, the energy efficiency of newly created smaller farms has not been considered as an issue in this assessment.

A.6 LOCATE PROCESSING AND MARKETING CLOSE TO PRODUCT SOURCE

As the planning measure states, agribusiness should be encouraged to locate close to the product source which is applicable to urban settlements (Type 1, 2, 3A and 3B) and rural areas (Type 5).

In the township plans, agribusiness is allowed in nodes in agricultural areas provided it uses a minimum amount of Class 1 and 2 farmland and, in some townships, only if it is not suitable to be located within an urban area. Most policies direct processing and marketing to the periphery of settlements. Within settlements agribusiness is generally allowed, subject to a rezoning.

The Huron County Plan allows industry and commercial and has set aside areas just outside the ten towns and villages for future industry and allows in the rural area. Within most of the towns and villages agribusiness may locate in highway commercial or industrial zones (Bayfield allows marketing but no industry).

A.7 ESTABLISH AND MAINTAIN AGRICULTURAL SERVICE SETTLEMENTS

As all the settlements within Huron County fulfill a role in the service hierarchy, all Type 1, 2, 3A and 3B settlements would be applicable. All township, village and town secondary plans have principles or objectives which recognize the importance of different types of settlements to function as service areas for both the settlement and the surrounding agricultural community. This is carried through in goals and policies which stress the establishment, maintenance and continued intensification of the core area as a servicing centre for a large rural market.

The Huron County Official Plan, as it applies to the four townships without secondary plans, does not specifically address the planning measure. An objective of the plan is to encourage the growth of existing urban development from the hamlet to the town, however, no mention is made concerning their role as centres to serve the needs of the surrounding agricultural community. As a result, this planning measure is only partially achievable in those areas utilizing the county plan while being achievable for the remaining settlements.

A.8 PROTECT WOODLOTS

While the protection of woodlots should be applicable in all settlement types, it is most applicable for energy conservation in the rural area (Type 5) and in seasonal settlements (Type 6).

In the township plans, the retention of remaining woodlots is a goal in most designations, including agriculture, natural environment, extractive resources and recreation. As well, agricultural and natural environment policies clearly express the intent to protect, maintain and re-establish woodlots, windbreaks and forests and allow minor clearing for convenience purposes only in accordance with the county tree cutting by-law.

While the Huron County Official Plan does designate hazard, conservation and forest lands it has not discussed in goals or policies, their protection and has, instead, outlined the administrations which have jurisdiction over certain lands. Where the county plan still has authority, this planning measure is partially achievable and is achievable in all other township plans.

A.9 INTENSIFY SEASONAL SETTLEMENTS

Seasonal settlements or cottage development is concentrated along the lakefront and is also found to a limited extent around the Lakelet resort area. As a result, the planning measure is only applicable to Type 6 settlements in those areas.

The seven township plans have recreation principles which allow additional development in limited amounts in areas where they will not consume prime agricultural land. Recreational policies dealing with seasonal residential outline the concept of clustering, density, lot size and seasonal zoning. All plans have the potential to be achievable in this planning measure.

A.10 MAINTAIN LARGE, CONTIGUOUS AGRICULTURAL AREAS

This planning measure, as outlined previously, applies to land use and is applicable in the non-urban areas (Type 5) in the townships. In all the township plans, agricultural principles and definitions emphasize the designation of large tracts of land for agriculture, even if not currently in production, in order to ensure its long term use in the county. Large tracts of land are subject to agricultural policies which ensure that most uses are agriculturally related. The Huron County Official Plan has designated large tracts of land as agriculture as well, however, there is no specific statement regarding its maintenance, except that rural areas include a broad range of uses in which the predominant land use is agricultural. Within that classification the predominant use of the land is farming but other related uses are permitted. As the plan is somewhat vague on this point, the planning measure is partially achievable.

B. SETTLEMENT LEVEL

B.1 MIXED USE DEVELOPMENT

This planning measure is intended to encourage a mix of residential, commercial and other uses to reduce vehicular use within a settlement. Those settlements which have substantial development are applicable and include Types 1, 2, 3A and 6 settlements. Due to the special design nature of Huron Park and Vanastra, these settlements are not considered applicable.

In almost all Type 3A settlements mixed use is achievable through rezoning. Fordwich, Gorrie, Wroxeter and Bayfield have plan designations for residential and commercial, and would require an amendment to the plan to integrate such uses. All Type 1 and 2 settlements have established core areas where apartments, institutional uses, etc. are encouraged and the planning measure is achievable in each. This planning measure is partially achievable in Wingham as it does not specifically address the issue.

B.2 INCREASING RESIDENTIAL DENSITIES

Settlements need to be of sufficient size to make this planning measure practicable and only Settlement Types 1, 2 and 3A were considered applicable. However, as the intensification of seasonal settlements is viewed as a planning measure which can potentially conserve energy, Type 6 settlements were also considered.

Township plans which address cottage development contain policies regarding density, and all encourage clustering and are considered achievable of increasing residential density.

All Type 1 and 2 settlements have areas designated as medium or high density and encourage mixing. Those Type 3A settlements considered achievable allow residential uses of all densities to establish. Those Type 3A settlements considered partially achievable allow higher densities to establish subject to certain provisions (rezoning, site plan analysis, etc.).

Neither Wingham nor Benmiller have addressed residential densities in their plans.

B.3 HIGHER INTENSITY OF COMMERCIAL AND INDUSTRIAL DEVELOPMENT

Only the larger settlements have the capacity to potentially intensify their commercial and industrial development and, as such, only Types 1, 2 and 3A settlements were considered with this planning measure.

All Type 1 and 2 settlements encourage the intensification of commercial and industrial development in their goals and policies. The only exception is Wingham which designates central area, highway commercial and industrial uses, but does not specifically address their intensification. Six of the fifteen Type 3A settlements have commercial and industrial designations and plan principles and goals which encourage their development. This planning measure is only partially achievable in the other Type 3A settlements.

Port Albert and Bayfield are considered only partially achievable as they do not allow industrial uses. The section of Colborne Township's Secondary Plan which applies to Benmiller has goals to promote commercial intensification but, policies only refer to minimum lot sizes.

B.4 CONCENTRATE COMMERCIAL DEVELOPMENT IN NODES AND ALONG CORRIDORS

As this planning measure requires a relatively large supply of commercial development, it is considered applicable only in Settlement Types 1 and 2 (towns and villages). In each of the plans dealing with these settlements areas of commercial concentration have been established in assumptions, definitions, goals and policies and generally include a downtown core and highway commercial corridor. General commerce is restricted to the core and those enterprises which are not compatable with the core area are forced to locate in the highway commercial designation. The planning measure is achievable in all these settlements.

B.5 PROVIDE LOCAL OR NEIGHBOURHOOD CONVENIENCE COMMERCIAL

In order to reduce vehicular traffic between population concentrations, each settlement should allow local convenience commercial to serve residents. This measure is applicable to hamlets, villages and cottage areas (Type 2, 3A, 3B and 6). However, in order to reduce internal trips in larger settlements (most Type 1) neighbourhood convenience commercial should be permitted as well. All Type 2, 3A and 3B settlement plans achieve this planning measure by encouraging core development in goals and by allowing local commercial to establish through rezoning contained in their policies. Applicable Type 1 settlements (Exeter, Goderich, Seaforth and Wingham) allow neighbourhood convenience commerce with the exception of Clinton which has not included it in residential secondary uses.

In none of the townships where there is cottage development (Ashfield, Colborne, Goderich, Hay, Howick, Stanley and Stephen) have the secondary plans addressed local commercial uses. However, as the Huron County Official Plan does allow commerce in these seasonal recreation areas, the planning measure is achievable.

B.6 INFILLING WITH BUILDINGS

As a measure to conserve energy, infilling is determined to be applicable to all development in concentrations (Settlement Types 1, 2, 3A, 3B and 6 - towns, villages, hamlets and cottage areas).

In the township plans, policy statements encourage development by infilling in hamlets and villages. Land division policies in those townships with cottage development will also consider severances which serve to infill developed areas.

All Type 1 and 2 settlements allow infilling and most policies encourage this measure in the core area. This planning measure is achievable in settlements throughout the townships.

B.7 RE-USE AND CONVERSION OF EXISTING BUILDINGS AND REDEVELOPMENT OF LAND

As this planning measure deals with conversions to multiple family units and changing uses within industrial and commercial areas, it was determined to be applicable to Settlements Type 1, 2 and 3A, which have the appropriate building infrastraucture already in place.

In the township plans which deal with Type 3A settlements, there is no specific mention of building conversions or land redevelopment. Generally, policies permit low density residential in all residential areas while commercial, industrial and higher density residential uses are subject to a rezoning. Although building conversions are not prohibited and in practice are probably allowed, their absense in township secondary plans places this planning measure under partially achievable. Official and secondary plans for Settlement Types 1 and 2 have a number of policies in place regarding conversions of single family dwellings into multiple units and rehabilitation strategies in the core and, as such, are considered achievable. The Wingham plan does not mention this planning measure.

B.9, B.10 WALKING/BICYCLE PATHS

This planning measure is most applicable in the larger urban centres as it serves to reduce the use of the car within settlements.

Four of the plans have policies which encourage bicycle and walking paths, one has reference to walkways for pedestrians under goals, and the remaining four applicable settlements make no reference to this planning measure. Due to the special design nature of Huron Park and Vanastra, the planning measure is not applicable in these settlements.

B.11 INTERNAL STREET SYSTEM LIMITS

This planning measure has incorporated two energy conservation techniques. The first is to reduce the amount of asphalt used in widths and rights-of-way and is applicable in the larger urban areas. Most of the official plans and secondary plans allow new streets to have smaller rights-of-way. The second technique is to reduce the number of through-streets to encourage pedestrian traffic rather than vehicular. Five of the Type 1 and 2 settlements have residential policies in place to encourage this and have been listed as achievable, while most of those remaining are partially achievable. The Wingham plan lacks the detail to make this measure achievable. Huron Park and Vanastra are not considered applicable because of their original design.

B.12 JOINT USE OF PUBLIC FACILITIES

This planning measure is applicable to all facilities, most of which are found in Settlement Types 1, 2, 3A, 3B and 5. The township plans deal with recreation throughout the area and parks and institutional uses within established communities, however, none mention shared or joint uses. As this measure is not encouraged in the plans, it is considered not achievable.

In Settlement Types 1 and 2 with their own secondary plans, most achieve this planning measure in goals and policies which encourage shared uses. The remaining plans (Blyth, Hensall and Wingham) have objectives or goals which serve to guide the location and development of institutional uses so this planning measure may be partially achievable.

B.13 ALLOW HOME OCCUPATIONS

As this planning measure has the effect of reducing vehicle traffic through localized commercial enterprises within residential areas, it is applicable to all residential settlements.

All Type 1 and 2 Settlements (with the exception of Hensall and Huron Park) have residential policies which allow home occupations. Hensall has policies which allow secondary uses in residential areas however, home occupations are not included. Huron Park has a specific policy which does not allow home occupations.

Most of the township secondary plans do not mention home occupations in policies for villages, hamlets or the farm and cottage areas, although a few of the larger settlements have included policies for this planning measure. As a result most settlements are listed as not achievable. The Official Plan for Huron County, however, does allow home occupations in urban areas but does not mention it in farm or cottage areas. It is assumed that secondary plans have the overriding option to include this planning measure, and its lack of mention makes it not achievable.

B.14 PROVIDE LOCALIZED RECREATIONAL AREAS

This planning measure is applicable to all urban areas and in the farm settlements as well and serves as a measure to reduce energy used in vehicular movements. In Settlement Types 1 and 2 policies for parks and facilities have allowed this planning measure to be achieved. In the township plans, however, which deal with the remaining settlements, the provision of park space within the urban areas is only promoted through residential goals. Although there is a recreational designation in these plans which, by definition, would include localized recreation, the policies only address cottage and campground development. As such, this planning measure is partially achievable.

C. SITE, BUILDING, DESIGN AND OPERATION LEVEL

C.1 ORIENTATION OF LOTS, BUILDINGS AND STREETS WITH RESPECT TO SUN AND WIND

As this planning measure will assist in energy conservation in all buildings, it is applicable to all settlement types.

Energy conservation policies have only been introduced in three settlements (Clinton, Goderich and Seaforth) and have regard for road, lot and building alignment to maximize solar potential. None of the remaining plans address this planning measure.

C.2 LANDSCAPING AND BUFFERING OF HOUSES AND ROADS

This planning measure can be utilized in all forms and densities of settlements to reduce energy expenditures in buildings. Although it is applicable to all settlements, it is only achievable in some secondary plans. Three settlements have provisions in their residential section and energy policies to utilize landscaping and buffering. Both Blyth and Hensall plans have community design sections which have policies related to treescape and buffering, but do not specifically focus on energy conservation and are considered partially achievable. Those settlements remaining have no plan reference to this planning measure.

C.3 SOLAR ACCESS PROTECTION

This planning measure considers building access to light and heat and the effect height and magnitude have on the shading of abutting buildings. For this to happen there must be sufficient pressure to locate close together, which makes concentrated settlements (Type 1, 2, 3A, 3B, 6) applicable. No plans, however, deal with this issue and it is considered not achievable.

C.4 CLUSTERING OF BUILDINGS

It is determined that this measure is applicable to areas which may already have higher concentrations of buildings (Type 1, 2, and 6).

The township plans, which deal with cottage development have policies which encourage clustering. Goderich and Seaforth plans have goals and policies which address this issue and achieve it. Clinton and Hensall have goals which allow clustering under certain designations but do not have specific policies in place to strengthen them. The remaining areas' secondary plans make no reference to clustering.

C.5 MINIMUM PROPERTY STANDARDS

In order to encourage energy efficiency in the buildings, this measure is applicable to all forms of settlement. It is concluded that those plans with reference to minimum property standards would be partially achievable as they do not specifically address energy conservation practices. Those areas with no property standards provisions in their plans are not achievable.

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

A.1 DISCOURAGE SPORADIC NON-FARM RESIDENTIAL DEVELOPMENT

PLANNING MEASURES LEVEL: COUNTY	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.	0		
COLBORNE TWP.	0		
EAST WAWANOSH TWP.	0		
GODERICH TWP.	0		
GREY TWP.	0		
HAY TWP.	0		
HOWICK TWP.	0		
HULLETT TWP.	0		
McKILLOP TWP.	0		
MORRIS TWP.	0		
STANLEY TWP.	0		
STEPHEN TWP.	0		
TUCKERSMITH TWP.	0		
TURNBERRY TWP.	0		
USBORNE TWP.	0		
WEST WAWANOSH TWP.	0		
HURON COUNTY	0		
BAYFIELD			
BLYTH			
BRUSSELS			
CLINTON			
EXETER			
GODERICH			
HENSALL			
SEAFORTH			
WINGHAM			
ZURICH			

0	Indicates level of achievability
6	Type 6 Settlements only
3	Type 3A and 3B Settlements only
A	Type 3A Settlements only
B	Type 3B, 4, 5 and 6 Settlements only
U	Urban areas only
F	Farm and seasonal areas only

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

A.2 EXPAND EXISTING BUILT UP AREAS, PARTICULARLY ON MAJOR ROADS

PLANNING MEASURES LEVEL: COUNTY	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.	0		
COLBORNE TWP.	0		
EAST WAWANOSH TWP.	0		
GODERICH TWP.	0		
GREY TWP.	0		
HAY TWP.	0		
HOWICK TWP.	0		
HULLETT TWP.	0		
McKILLOP TWP.	0		
MORRIS TWP.	0		
STANLEY TWP.	0		
STEPHEN TWP.	0		
TUCKERSMITH TWP.	0		
TURNBERRY TWP.	0		
USBORNE TWP.	0		
WEST WAWANOSH TWP.	0		
HURON COUNTY	0		
BAYFIELD	0		
BLYTH	0		
BRUSSELS	0		
CLINTON	0		
EXETER	0		
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM	0		
ZURICH	0		

0	Indicates level of achievability
6	Type 6 Settlements only
3	Type 3A and 3B Settlements only
A	Type 3A Settlements only
B	Type 3B, 4, 5 and 6 Settlements only
U	Urban areas only
F	Farm and seasonal areas only

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

A.3 UTILIZE AND MAXIMIZE EXISTING INFRASTRUCTURE

PLANNING MEASURES LEVEL: COUNTY	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.			
COLBORNE TWP.			
EAST WAWANOSH TWP.			
GODERICH TWP.			
GREY TWP.			
HAY TWP.			
HOWICK TWP.			
HULLETT TWP.			
McKILLOP TWP.			
MORRIS TWP.			
STANLEY TWP.			
STEPHEN TWP. HURON PARK	0		
TUCKERSMITH TWP. VANASTRA	0		
TURNBERRY TWP.			
USBORNE TWP.			
WEST WAWANOSH TWP.			
HURON COUNTY			
BAYFIELD			
BLYTH	0		
BRUSSELS	0		
CLINTON	0		
EXETER	0		
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM			0
ZURICH	0		

0	Indicates level of achievability
6	Type 6 Settlements only
3	Type 3A and 3B Settlements only
A	Type 3A Settlements only
B	Type 3B, 4, 5 and 6 Settlements only
U	Urban areas only
F	Farm and seasonal areas only

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

A.4 PRESERVE PRIME AGRICULTURAL LAND

PLANNING MEASURES LEVEL: COUNTY	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.	0		
COLBORNE TWP.	0		
EAST WAWANOSH TWP.	0		
GODERICH TWP.	0		
GREY TWP.	0		
HAY TWP.	0		
HOWICK TWP.	0		
HULLETT TWP.		0	
McKILLOP TWP.		0	
MORRIS TWP.		0	
STANLEY TWP.	0		
STEPHEN TWP.	0		
TUCKERSMITH TWP.	0		
TURNBERRY TWP.	0		
USBORNE TWP.	0		
WEST WAWANOSH TWP.		0	
HURON COUNTY		0	
BAYFIELD			
BLYTH			
BRUSSELS			
CLINTON			
EXETER			
GODERICH			
HENSALL			
SEAFORTH			
WINGHAM			
ZURICH			

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

A.5 OPTIMIZE PARCEL SIZE FOR FIELD OPERATIONS

PLANNING MEASURES LEVEL: COUNTY	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.			0
COLBORNE TWP.			0
EAST WAWANOSH TWP.			0
GODERICH TWP.			0
GREY TWP.			0
HAY TWP.			0
HOWICK TWP.			0
HULLETT TWP.			0
McKILLOP TWP.			0
MORRIS TWP.			0
STANLEY TWP.			0
STEPHEN TWP.			0
TUCKERSMITH TWP.			0
TURNBERRY TWP.			0
USBORNE TWP.			0
WEST WAWANOSH TWP.			0
HURON COUNTY			0
BAYFIELD			
BLYTH			
BRUSSELS			
CLINTON			
EXETER			
GODERICH			
HENSALL			
SEAFORTH			
WINGHAM			
ZURICH			

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

A.6 LOCATE PROCESSING AND MARKETING CLOSE TO PRODUCT SOURCE

PLANNING MEASURES LEVEL: COUNTY	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.	0		
COLBORNE TWP.	0		
EAST WAWANOSH TWP.	0		
GODERICH TWP.	0		
GREY TWP.	0		
HAY TWP.	0		
HOWICK TWP.	0		
HULLETT TWP.	0		
McKILLOP TWP.	0		
MORRIS TWP.	0		
STANLEY TWP.	0		
STEPHEN TWP.	0		
TUCKERSMITH TWP.	0		
TURNBERRY TWP.	0		
USBORNE TWP.	0		
WEST WAWANOSH TWP.	0		
HURON COUNTY	0		
BAYFIELD		0	
BLYTH	0		
BRUSSELS	0		
CLINTON	0		
EXETER	0		
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM	0		
ZURICH	0		

0 Indicates level of achievability
6 Type 6 Settlements only
3 Type 3A and 3B Settlements only
A Type 3A Settlements only
B Type 3B, 4, 5 and 6 Settlements only
U Urban areas only
F Farm and seasonal areas only

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

A.7 ESTABLISH AND MAINTAIN AGRICULTURAL SERVICE SETTLEMENTS

PLANNING MEASURES LEVEL: COUNTY	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.	0		
COLBORNE TWP.	0		
EAST WAWANOSH TWP.	0		
GODERICH TWP.	0		
GREY TWP.	0		
HAY TWP.	0		
HOWICK TWP.	0		
HULLETT TWP.		0	
McKILLOP TWP.		0	
MORRIS TWP.		0	
STANLEY TWP.	0		
STEPHEN TWP.	0		
TUCKERSMITH TWP.	0		
TURNBERRY TWP.	0		
USBORNE TWP.	0		
WEST WAWANOSH TWP.		0	
HURON COUNTY		0	
BAYFIELD	0		
BLYTH	0		
BRUSSELS	0		
CLINTON	0		
EXETER	0		
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM	0		
ZURICH	0		

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

A.8 PROTECT WOODLOTS

PLANNING MEASURES LEVEL: COUNTY	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.	0		
COLBORNE TWP.	0		
EAST WAWANOSH TWP.	0		
GODERICH TWP.	0		
GREY TWP.	0		
HAY TWP.	0		
HOWICK TWP.	0		
HULLETT TWP.		0	
McKILLOP TWP.		0	
MORRIS TWP.		0	
STANLEY TWP.	0		
STEPHEN TWP.	0		
TUCKERSMITH TWP.	0		
TURNBERRY TWP.	0		
USBORNE TWP.	0		
WEST WAWANOSH TWP.		0	
HURON COUNTY		0	
BAYFIELD			
BLYTH			
BRUSSELS			
CLINTON			
EXETER			
GODERICH			
HENSALL			
SEAFORTH			
WINGHAM			
ZURICH			

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

A.9 INTENSIFY SEASONAL SETTLEMENTS

PLANNING MEASURES LEVEL: COUNTY	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.	0		
COLBORNE TWP.	0		
EAST WAWANOSH TWP.			
GODERICH TWP.	0		
GREY TWP.			
HAY TWP.	0		
HOWICK TWP.	0		
HULLETT TWP.			
McKILLOP TWP.			
MORRIS TWP.			
STANLEY TWP.	0		
STEPHEN TWP.	0		
TUCKERSMITH TWP.			
TURNBERRY TWP.			
USBORNE TWP.			
WEST WAWANOSH TWP.			
HURON COUNTY			
BAYFIELD			
BLYTH			
BRUSSELS			
CLINTON			
EXETER			
GODERICH			
HENSALL			
SEAFORTH			
WINGHAM			
ZURICH			

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 5 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

A.10 MAINTAIN LARGE, CONTIGUOUS AGRICULTURAL AREAS

PLANNING MEASURES LEVEL: COUNTY	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.	0		
COLBORNE TWP.	0		
EAST WAWANOSH TWP.	0		
GODERICH TWP.	0		
GREY TWP.	0		
HAY TWP.	0		
HOWICK TWP.	0		
HULLETT TWP.		0	
McKILLOP TWP.		0	
MORRIS TWP.		0	
STANLEY TWP.	0		
STEPHEN TWP.	0		
TUCKERSMITH TWP.	0		
TURNBERRY TWP.	0		
USBORNE TWP.	0		
WEST WAWANOSH TWP.		0	
HURON COUNTY		0	
BAYFIELD			
BLYTH			
BRUSSELS			
CLINTON			
EXETER			
GODERICH			
HENSALL			
SEAFORTH			
WINGHAM			
ZURICH			

0	Indicates level of achievability
6	Type 6 Settlements only
3	Type 3A and 3B Settlements only
A	Type 3A Settlements only
B	Type 3B, 4, 5 and 6 Settlements only
U	Urban areas only
F	Farm and seasonal areas only

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

B.1 MIXED USE DEVELOPMENT

PLANNING MEASURES LEVEL: SETTLEMENT	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP. (DUNGANNON, PORT ALBERT)	0		
COLBORNE TWP. (BENMILLER)	0		
EAST WAWANOSH TWP. (AUBURN, BELGRAVE)	0		
GODERICH TWP.			
GREY TWP. (ETHEL)	0		
HAY TWP.			
HOWICK TWP. (FORDWICH, GORRIE, WROXETER)		0	
HULLETT TWP.			
McKILLOP TWP.			
MORRIS TWP.			
STANLEY TWP.			
STEPHEN TWP. (DASHWOOD, CENTRALIA, CREDITON)	0		
TUCKERSMITH TWP. (EGMONDVILLE)	0		
TURNBERRY TWP. (BLUEVALE)	0		
USBORNE TWP.			
WEST WAWANOSH TWP.			
HURON COUNTY	0		
BAYFIELD		0	
BLYTH	0		
BRUSSELS	0		
CLINTON	0		
EXETER	0		
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM		0	
ZURICH	0		

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

B.2 INCREASE RESIDENTIAL DENSITIES

PLANNING MEASURES LEVEL: SETTLEMENT	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP. (DUNGANNON, PORT ALBERT)	6	0	
COLBORNE TWP. (BENMILLER)	6		0
EAST WAWANOSH TWP. (AUBURN, BELGRAVE)		0	
GODERICH TWP.	6		
GREY TWP. (ETHEL)		0	
HAY TWP.	6		
HOWICK TWP. (FORDWICH, GORRIE, WROXETER)	6 0		
HULLETT TWP.			
McKILLOP TWP.			
MORRIS TWP.			
STANLEY TWP.	6		
STEPHEN TWP. (DASHWOOD, CENTRALIA, CREDITON, HURON PARK)	6 0	0 HURON PARK	
TUCKERSMITH TWP. (EGMONDVILLE, VANESTRA)	0	0 EGMONDVILLE	
TURNBERRY TWP. (BLUEVALE)		0	
USBORNE TWP.			
WEST WAWANOSH TWP.			
HURON COUNTY			
BAYFIELD	0		
BLYTH	0		
BRUSSELS	0		
CLINTON	0		
EXETER	0		
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM			0
ZURICH	0		

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

B.3 HIGHER INTENSITY COMMERCIAL AND INDUSTRIAL DEVELOPMENT

PLANNING MEASURES LEVEL: SETTLEMENT	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP. (DUNGANNON, PORT ALBERT)		0	
COLBORNE TWP. (BENMILLER)		0	
EAST WAWANOSH TWP. (AUBURN, BELGRAVE)		0	
GODERICH TWP.			
GREY TWP. (ETHEL)		0	
HAY TWP.			
HOWICK TWP. (FORDWICH, GORRIE, WROXETER)	0		
HULLETT TWP.			
McKILLOP TWP.			
MORRIS TWP.			
STANLEY TWP.			
STEPHEN TWP. (DASHWOOD, CENTRALIA CREDITON, HURON PARK)	0		
TUCKERSMITH TWP. (EGMONDVILLE, VANESTRA)	0 VANESTRA	0 EGMONDVILLE	
TURNBERRY TWP. (BLUEVALE)		0	
USBORNE TWP.			
WEST WAWANOSH TWP.			
HURON COUNTY			
BAYFIELD		0	
BLYTH	0		
BRUSSELS	0		
CLINTON	0		
EXETER	0		
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM		0	
ZURICH	0		

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

B.4 CONCENTRATE COMMERCIAL DEVELOPMENT IN NODES AND ALONG CORRIDORS

PLANNING MEASURES LEVEL: SETTLEMENT	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.			
COLBORNE TWP.			
EAST WAWANOSH TWP.			
GODERICH TWP.			
GREY TWP.			
HAY TWP.			
HOWICK TWP.			
HULLETT TWP.			
McKILLOP TWP.			
MORRIS TWP.			
STANLEY TWP.			
STEPHEN TWP. HURON PARK	0		
TUCKERSMITH TWP. VANESTRA	0		
TURNBERRY TWP.			
USBORNE TWP.			
WEST WAWANOSH TWP.			
HURON COUNTY			
BAYFIELD			
BLYTH	0		
BRUSSELS	0		
CLINTON	0		
EXETER	0		
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM	0		
ZURICH	0		

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

B.5 PROVIDE LOCAL OR NEIGHBOURHOOD CONVENIENCE COMMERCIAL

PLANNING MEASURES LEVEL: SETTLEMENT	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.	3 6		
COLBORNE TWP.	3 6		
EAST WAWANOSH TWP.	3		
GODERICH TWP.	3 6		
GREY TWP.	3		
HAY TWP.	3 6		
HOWICK TWP.	3 6		
HULLETT TWP.	0		
McKILLOP TWP.	0		
MORRIS TWP.	0		
STANLEY TWP.	3 6		
STEPHEN TWP.	3 6		
TUCKERSMITH TWP.	3		
TURNBERRY TWP.	3		
USBORNE TWP.	3		
WEST WAWANOSH TWP.	0		
HURON COUNTY	0		
BAYFIELD	0		
BLYTH	0		
BRUSSELS	0		
CLINTON			0
EXETER	0		
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM	0		
ZURICH	0		

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

B.6 INFILLING WITH BUILDINGS

PLANNING MEASURES LEVEL: SETTLEMENT	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.	0		
COLBORNE TWP.	0		
EAST WAWANOSH TWP.	0		
GODERICH TWP.	0		
GREY TWP.	0		
HAY TWP.	0		
HOWICK TWP.	0		
HULLETT TWP.	0		
McKILLOP TWP.	0		
MORRIS TWP.	0		
STANLEY TWP.	0		
STEPHEN TWP.	0		
TUCKERSMITH TWP.	0		
TURNBERRY TWP.	0		
USBORNE TWP.	0		
WEST WAWANOSH TWP.	0		
HURON COUNTY	0		
BAYFIELD	0		
BLYTH	0		
BRUSSELS	0		
CLINTON	0		
EXETER	0		
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM	0		
ZURICH	0		

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

B.7 RE-USE AND CONVERSION OF EXISTING BUILDINGS AND DEVELOPMENT OF LAND

PLANNING MEASURES LEVEL: SETTLEMENT	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP. (DUNGANNON, PT. ALBERT)		0	
COLBORNE TWP. (BENMILLER)		0	
EAST WAWANOSH TWP. (AUBURN, BELGRAVE)		0	
GODERICH TWP.			
GREY TWP. (ETHEL)		0	
HAY TWP.			
HOWICK TWP. (FORDWICH, GORRIE, WROXETER)		0	
HULLETT TWP.			
McKILLOP TWP.			
MORRIS TWP.			
STANLEY TWP.			
STEPHEN TWP. (DASHWOOD, CENTRALIA CREDITON, HURON PARK)		0	
TUCKERSMITH TWP. (EGMONDVILLE, VANESTRA)		0	
TURNBERRY TWP. (BLUEVALE)		0	
USBORNE TWP.			
WEST WAWANOSH TWP.			
HURON COUNTY			
BAYFIELD		0	
BLYTH	0		
BRUSSELS	0		
CLINTON	0		
EXETER	0		
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM			0
ZURICH	0		

0 Indicates level of achievability
6 Type 6 Settlements only
3 Type 3A and 3B Settlements only
A Type 3A Settlements only
B Type 3B, 4, 5 and 6 Settlements only
U Urban areas only
F Farm and seasonal areas only

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

B.9, B.10 WALKING/BICYCLE PATHS

PLANNING MEASURES LEVEL: SETTLEMENT	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.			
COLBORNE TWP.			
EAST WAWANOSH TWP.			
GODERICH TWP.			
GREY TWP.			
HAY TWP.			
HOWICK TWP.			
HULLETT TWP.			
McKILLOP TWP.			
MORRIS TWP.			
STANLEY TWP.			
STEPHEN TWP.			
TUCKERSMITH TWP.			
TURNBERRY TWP.			
USBORNE TWP.			
WEST WAWANOSH TWP.			
HURON COUNTY			
BAYFIELD			
BLYTH		0	
BRUSSELS			0
CLINTON	0		
EXETER			0
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM			0
ZURICH			0

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

B.11 INTERNAL STREET SYSTEM LIMITS

PLANNING MEASURES LEVEL: SETTLEMENT	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.			
COLBORNE TWP.			
EAST WAWANOSH TWP.			
GODERICH TWP.			
GREY TWP.			
HAY TWP.			
HOWICK TWP.			
HULLETT TWP.			
McKILLOP TWP.			
MORRIS TWP.			
STANLEY TWP.			
STEPHEN TWP.			
TUCKERSMITH TWP.			
TURNBERRY TWP.			
USBORNE TWP.			
WEST WAWANOSH TWP.			
HURON COUNTY			
BAYFIELD			
BLYTH	0		
BRUSSELS		0	
CLINTON	0		
EXETER		0	
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM			0
ZURICH		0	

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

B.12 JOINT USE OF PUBLIC FACILITIES

PLANNING MEASURES LEVEL: SETTLEMENT	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.			0
COLBORNE TWP.			0
EAST WAWANOSH TWP.			0
GODERICH TWP.			0
GREY TWP.			0
HAY TWP.			0
HOWICK TWP.			0
HULLETT TWP.			0
McKILLOP TWP.			0
MORRIS TWP.			0
STANLEY TWP.			0
STEPHEN TWP.			0
TUCKERSMITH TWP.			0
TURNBERRY TWP.			0
USBORNE TWP.			0
WEST WAWANOSH TWP.			0
HURON COUNTY			0
BAYFIELD		0	
BLYTH		0	
BRUSSELS	0		
CLINTON	0		
EXETER	0		
GODERICH	0		
HENSALL		0	
SEAFORTH	0		
WINGHAM		0	
ZURICH	0		

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

B.13 ALLOW HOME OCCUPATIONS

PLANNING MEASURES LEVEL: SETTLEMENT	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.			A B
COLBORNE TWP.			A B
EAST WAWANOSH TWP.			A B
GODERICH TWP.			B
GREY TWP.			A B
HAY TWP.			B
HOWICK TWP.	A		B
HULLETT TWP.	U		F
McKILLOP TWP.	U		F
MORRIS TWP.	U		F
STANLEY TWP.			B
STEPHEN TWP.	A		B 0 HURON PARK
TUCKERSMITH TWP.	0 VANESTRA		A B
TURNBERRY TWP.			A
USBORNE TWP.			B
WEST WAWANOSH TWP.	U		F
HURON COUNTY	0 U		0 F
BAYFIELD	0		
BLYTH	0		
BRUSSELS	0		
CLINTON	0		
EXETER	0		
GODERICH	0		
HENSALL			0
SEAFORTH	0		
WINGHAM	0		
ZURICH	0		

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

B.14 PROVIDE LOCALIZED RECREATIONAL AREAS

PLANNING MEASURES LEVEL: SETTLEMENT	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.		0	
COLBORNE TWP.		0	
EAST WAWANOSH TWP.		0	
GODERICH TWP.		0	
GREY TWP.		0	
HAY TWP.		0	
HOWICK TWP.		0	
HULLETT TWP.		0	
McKILLOP TWP.		0	
MORRIS TWP.		0	
STANLEY TWP.		0	
STEPHEN TWP.		0	
TUCKERSMITH TWP.		0	
TURNBERRY TWP.		0	
USBORNE TWP.		0	
WEST WAWANOSH TWP.		0	
HURON COUNTY		0	
BAYFIELD	0		
BLYTH	0		
BRUSSELS	0		
CLINTON	0		
EXETER	0		
GODERICH	0		
HENSALL	0		
SEAFORTH	0		
WINGHAM	0		
ZURICH	0		

0	Indicates level of achievability
6	Type 6 Settlements only
3	Type 3A and 3B Settlements only
A	Type 3A Settlements only
B	Type 3B, 4, 5 and 6 Settlements only
U	Urban areas only
F	Farm and seasonal areas only

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

C.1 ORIENTATION OF LOTS, BUILDINGS AND STREETS WITH RESPECT TO SUN AND WIND

PLANNING MEASURES LEVEL: SITE, BUILDING & OPERATIONS	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.			0
COLBORNE TWP.			0
EAST WAWANOSH TWP.			0
GODERICH TWP.			0
GREY TWP.			0
HAY TWP.			0
HOWICK TWP.			0
HULLETT TWP.			0
McKILLOP TWP.			0
MORRIS TWP.			0
STANLEY TWP.			0
STEPHEN TWP.			0
TUCKERSMITH TWP.			0
TURNBERRY TWP.			0
USBORNE TWP.			0
WEST WAWANOSH TWP.			0
HURON COUNTY			0
BAYFIELD			0
BLYTH			0
BRUSSELS			0
CLINTON	0		
EXETER			0
GODERICH	0		
HENSALL			0
SEAFORTH	0		
WINGHAM			0
ZURICH			0

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

C.2 LANDSCAPING AND BUFFERING OF HOUSES AND ROADS

PLANNING MEASURES LEVEL: SITE, BUILDING & OPERATIONS	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.			0
COLBORNE TWP.			0
EAST WAWANOSH TWP.			0
GODERICH TWP.			0
GREY TWP.			0
HAY TWP.			0
HOWICK TWP.			0
HULLETT TWP.			0
McKILLOP TWP.			0
MORRIS TWP.			0
STANLEY TWP.			0
STEPHEN TWP.			0
TUCKERSMITH TWP.			0
TURNBERRY TWP.			0
USBORNE TWP.			0
WEST WAWANOSH TWP.			0
HURON COUNTY			0
BAYFIELD			0
BLYTH		0	
BRUSSELS			0
CLINTON	0		
EXETER			0
GODERICH	0		
HENSALL		0	
SEAFORTH	0		
WINGHAM			0
ZURICH			0

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

C.3 SOLAR ACCESS PROTECTION

PLANNING MEASURES LEVEL: SITE, BUILDING & OPERATIONS	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.			0
COLBORNE TWP.			0
EAST WAWANOSH TWP.			0
GODERICH TWP.			0
GREY TWP.			0
HAY TWP.			0
HOWICK TWP.			0
HULLETT TWP.			0
McKILLOP TWP.			0
MORRIS TWP.			0
STANLEY TWP.			0
STEPHEN TWP.			0
TUCKERSMITH TWP.			0
TURNBERRY TWP.			0
USBORNE TWP.			0
WEST WAWANOSH TWP.			0
HURON COUNTY			0
BAYFIELD			0
BLYTH			0
BRUSSELS			0
CLINTON			0
EXETER			0
GODERICH			0
HENSALL			0
SEAFORTH			0
WINGHAM			0
ZURICH			0

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

C.4 CLUSTERING OF BUILDINGS

PLANNING MEASURES LEVEL: SITE, BUILDING & OPERATIONS	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.	6		
COLBORNE TWP.	6		
EAST WAWANOSH TWP.			
GODERICH TWP.	6		
GREY TWP.			
HAY TWP.	6		
HOWICK TWP.	6		
HULLETT TWP.			
McKILLOP TWP.			
MORRIS TWP.			
STANLEY TWP.	6		
STEPHEN TWP.	6		
TUCKERSMITH TWP.			
TURNBERRY TWP.			
USBORNE TWP.			
WEST WAWANOSH TWP.			
HURON COUNTY			
BAYFIELD			0
BLYTH			0
BRUSSELS			0
CLINTON		0	
EXETER			0
GODERICH	0		
HENSALL		0	
SEAFORTH	0		
WINGHAM			0
ZURICH			0

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

HURON COUNTY ENERGY CONSERVATION STUDY
PLANNING MEASURES ACHIEVABILITY INDEX

C.5 MINIMUM PROPERTY STANDARDS

PLANNING MEASURES LEVEL: SITE, BUILDING & OPERATIONS	ACHIEVABLE	PARTIALLY ACHIEVABLE	NOT ACHIEVABLE
ASHFIELD TWP.		0	
COLBORNE TWP.		0	
EAST WAWANOSH TWP.		0	
GODERICH TWP.			0
GREY TWP.			0
HAY TWP.		0	
HOWICK TWP.			0
HULLETT TWP.		0	
McKILLOP TWP.		0	
MORRIS TWP.		0	
STANLEY TWP.		0	
STEPHEN TWP.		0	
TUCKERSMITH TWP.		0	
TURNBERRY TWP.		0	
USBORNE TWP.		0	
WEST WAWANOSH TWP.		0	
HURON COUNTY		0	
BAYFIELD			0
BLYTH		0	
BRUSSELS			0
CLINTON		0	
EXETER		0	
GODERICH		0	
HENSALL		0	
SEAFORTH		0	
WINGHAM			0
ZURICH			0

0	Indicates level of achievability	B	Type 3B, 4, 5 and 6 Settlements only
6	Type 6 Settlements only	U	Urban areas only
3	Type 3A and 3B Settlements only	F	Farm and seasonal areas only
A	Type 3A Settlements only		

11.0 ACHIEVABILITY OF PLANNING MEASURES THROUGH FOOD LAND GUIDELINES, 1978

A.1 DISCOURAGE SPORADIC NON-FARM RESIDENTIAL DEVELOPMENT

Section 1.12	protect land area where agriculture can occur with a minimum of disruptions from competing or non-compatible land uses.
Section 3.12(3)	estate residential demand - consider accomodating on low agricultural capability lands well removed from agricultural activities - restricted in location and amount or prohibited - if permitted, must be in separate designation.
Section 4A.11	statement on severances: encourage rural residential to locate on other than prime resource lands, preferably in existing urban areas - permissible only if related to agricultural needs.
Section 4A.20(3)	surplus farm house - minimum sized lot.
(4)	retiring farmer encouraged to consider retirement in nearby town/village or in a relocatable house on farm.
(5)	housing for farm help - part of farm unit - no new lot.
Section 4A.22, .23	problems of non-farm residences.
.24	policies should direct such development away from agricultural land.
.25	provide areas for this demand - first encouraged to villages and hamlets - if not, provide in areas not suitable for agricultural designation - low potential and in separate designation - must not be allowed within high priority agricultural designation.

A.2 EXPAND EXISTING BUILT UP AREAS PARTICULARLY ON MAJOR ROADS

Section 3.14	documentation of need (necessity, amount, location) i.e. projected population growth and demand, infilling potential, logical extension, low rating.
Section 4A.4	expansion of towns must be placed in a separate designation from agriculture.
Section 4A.9	agricultural code of practice - separation from livestock.
Section 4B.3	agri-urban boundary - buffer designation - land not needed for urban development as this is accomodated in urban designations.
Section 4C.3	hamlets - growth should be limited/logical extension of existing development, grouped and not scattered.
.4	substantial growth not encouraged - poorer agricultural lands.
.5	villages/towns - choose which are to expand (encourage on poorer land) designate, if better lands not retained must justify need - increase densities, infill, redirect growth.
.6	staging of boundary growth and time limits.

A.4 PRESERVE PRIME AGRICULTURAL LAND

Section 1.12	protect land area for long term basis.
Section 2.1	identify and inventory resource lands.
2.3	lands with potential for agriculture - not just those already in production.
Section 3.2	rate and set priorities for types of farmland.
Section 3.12	alternative uses - analyze needs/priority - highway commercial, institutional, rural industrial, estates - directed to nearby urban areas or on low priority agricultural lands.
Section 3.13	high capability agricultural lands given priority/document need for alternative use.
Section 4A.1	high priority rating objective is to create areas of high priority agricultural land which is as large as practical and uninterrupted by non-agricultural designations.
Section 4A.4	high priority - long term availability, land use, agriculture or compatible/directly related/require close proximity.
Section 4A.11	severances statement - only granted if related to agricultural needs - non-farm severances discouraged except on low priority land.
Section 4A.22	non-farm severances - direct away from agriculture and encouraged to villages/hamlets - if not suitable there, designate on limited low potential areas.
Section 4B.4	agri-urban boundary - buffer designation - no urban - minimal disruption of agricultural production.

A.5 OPTIMIZE FARM SIZE FOR FIELD OPERATIONS

Section 4A.15	agricultural capability: agriculture related and not reduce future usefulness.
.16	flexibility: large enough to permit change from economic conditions.
.17	suitability: type to area, parcel size to type.
.18	viability - both created and retained, if already broken but possible to use, no fragment.
Section 4A.20	farm related severances - severed and retained are appropriate size (4) - surplus farm house must use minimum land - retiring farmer to urban area or in relocatable house - workers residences part of farm unit and not separated lot - small lots.

A.6 LOCATE PROCESSING AND MARKETING CLOSE TO PRODUCT SOURCE

Section 3.12(2)	need - alternative uses - small industries directed to nearby urban areas or on low priority agricultural lands.
Section 3.14	documentation of need - necessity, land area, location.
Section 4A.6	compatible uses - industries related to agriculture which must be in close proximity to farm operations - if proximity not critical - locate on limited resource lands or in urban areas.

A.7 ESTABLISH AND MAINTAIN AGRICULTURAL SERVICE SETTLEMENTS

Section 3.12	need - alternative uses - highway commercial, institutional, small industries - directed to nearby urban areas.
Section 4A.6	agri-activities which do not critically require proximity to farm operations located in hamlets or towns.
Section 4A.11	pressure for rural estate severances encouraged to existing urban areas - statement.
Section 4A.20(4)	retiring farmer to locate in nearby urban area.
Section 4A.25	residential development encouraged to villages and hamlets to re-establish role as service areas.
Section 4C.3	hamlets - more attention - growth in keeping with character - (.4) service centres - limited growth into poor agricultural land.
Section 4C.5	villages and towns - minimize growth effect on agricultural lands - extension needs be justified - increase densities, growth directed to areas with low capability foodlands - infilling within boundaries.
Section 4C.6	boundary staging intervals.

A.8 PROTECT WOODLOTS

Section 1.8	guidelines intended for planning for agriculture and not address all issues (i.e. forestry, environmental areas).
Section 3.12	alternative uses - determine needs and priority if overlap.
Section 4A.8	forestry encouraged - some forest cover maintained in all agricultural areas through preservation of existing woodlots and planting windbreaks.

A.10 MAINTAIN LARGE, CONTIGUOUS AGRICULTURAL AREAS

Section 1.11	must ensure as much as possible of land with capability for agriculture is kept available (long term).
Section 2.3	in identifying agriculture resource lands must consider those with potential for agriculture and not just those already in production.
Section 3.12	must evaluate alternative uses by analyzing needs and document (4 issues).
Section 4A.1	create areas of predominantly high priority agricultural lands which are as large as practical and are uninterrupted by non-agricultural designations.

12.0 SOURCE MATERIAL

12.1 Energy Crisis and Policy
12.2 Alternative Energy and Renewables
12.3 Community Planning and Site Design
12.4 Agriculture and Energy
12.5 Outreach
12.6 Industrial and Commercial Energy Conservation
12.7 Municipal Operations
12.8 Transportation and Energy
12.9 Thermal Efficiency in Buildings

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110/736	Guide to Grain Dryers
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111/736	Reclaiming Corn Drying Energy
111/736	Digital Thermometer for Grain Temperature Sensing
181/736	Energy for Flue-Curing Tobacco
181/736	Energy Management with Bulk Tobacco Kilns
181/736	Energy Management with Forced-Air Tobacco Kilns
258/732	Artificial Curing of Onions
290/717	Commercial Applications of Supplementary Lighting in Greenhouses
290/717	Greenhouse Heating with Wood Waste
400/717	Air to Air Heat Exchangers for Winter Ventilation
400/717	Solar Ventilation Wall with Heat Storage
400/725	Spray Irrigation of Manure
400/727	Methane Production From Livestock Manure
410/717	Heat Recovery From Milk Cooling Systems
440/717	Supplemental Heat in Farrowing Houses
708	Comparative Heating Fuel Costs
708	Glossary of Solar Terms
708	Passive Solar Shop Heating
714	Insulation for Farm Buildings
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763	Average Amount of Fuel Your Tractor used for Various Farming Operations, January 1975
774.4	Interim Report on Heat Recovery from Dairy Barn Ventilation Air Using an Air Source Heat Pump
410/717	Energy Recovery from Milk - Can the heat be used effectively? -
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400/717	Heronbrook Hog Farm Heat Exchanger

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